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ABSTRACT

Presentations at this conference focused on how organizations and individuals are improving their efforts to serve learners at a distance through innovative approaches to competition and collaboration. Rapid developments in technology promise expanded access to education and training resources, but the developments challenge traditional policies and teaching-learning methods. This proceedings volume includes 66 papers presented at information sessions, and 13 tutorial and workshop papers. Topics covered include statewide computer training via satellite; international business education; two-way video advanced placement course for high school and college students; web resources; critical evaluation of information and tools; a model for K-12 videoconferencing; student attitudes about computer conferencing; communications conventions; storytelling for interactive television; evaluating distance education; virtual classrooms; policy for distance delivery; computer-based interaction; collaborative learning; Lotus Notes; interactivity in satellite training; web page instruction; web-based training; urban distance learning; partnerships in the information age; continuing professional education; special needs students in education and industry; agricultural distance learning; video teletraining; preparing information systems professionals for managerial roles; user friendly teleconferencing; partnering universities and public television; print-based distance learning materials; rural teacher certification program; teaching soft skills by distance; interactive WWW based learning modules; electronic libraries; culture of institutional rewards; Air Force collaboration with interactive television; knowledge management; influence of diversity on distance education; intellectual property and copyright issues; equal access to information for disabled students; designing and developing course for WWW delivery; and designing instruction based on naturally occurring interactions. (SWC)

ED 413 870

13th Annual

Conference on
# DISTANCE
Teaching & Learning

# Competition
# Connection
# Collaboration

August 6-8, 1997
Holiday Inn Madison West
Madison, Wisconsin

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## Proceedings

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# 13th Annual Conference on Distance Teaching and Learning

August 6–8, 1997
Madison, Wisconsin

The proceedings from the 13th Annual Conference on Distance Teaching and Learning contains nearly 80 papers that address, from a variety of perspectives, this year's conference theme of Competition-Connection-Collaboration. The papers describe how organizations and individuals are improving their efforts to serve learners at a distance through innovative approaches to competition and collaboration. As the theme suggests, rapid developments in technology promise expanded access to education and training resources, but the developments challenge traditional policies and teaching-learning methods. The changes are particularly evident in the growth of global computer networks, online education providers, partnership arrangements, and collaborative learning designs. The theme also suggests that while organizations may face competitive pressures, moving from competition to collaboration involves building connections to others locally and globally.

The papers in this proceedings provide many perspectives and strategies for connecting with learners. Some authors focus at the organizational level and describe innovations in policies, partnerships, or planning that enhance distance education efforts. Other authors examine teaching methods for creating interaction, teamwork, or multicultural connections. Still others report new research findings and lessons learned.

As old geographic boundaries give way to new global networks, there is much we need to learn about best practices in providing education and training via technology. This publication takes a step in that direction by providing insights into competitive and collaborative approaches to connecting with learners regionally, nationally, and internationally. My thanks to all those who so generously contributed papers to this proceedings. Not only were the papers the heart of the conference, but they also have lasting value in adding to the knowledge base about distance education and training.

Christine Olgren
Conference Chair
University of Wisconsin-Madison

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# Table of Contents

## Information Sessions

**Alice Anderson,** University of Wisconsin-Extension, Cooperative Extension
**Elizabeth (Lisa) A. Jansen,** University of Wisconsin-Madison
*Delivering Statewide Computer Training via Satellite* . . . 3

**Michal Beller,** The Open University of Israel
**Ehud Or,** The Open University of Israel
**Ronald Tuninga,** Open University of the Netherlands
*International Business Education: The Integration of Asynchronous and Synchronous Learning* . . 9

**Elaine Bennington,** Ivy Tech State College
**Dwight Macon,** Ivy Tech State College
*An Irresistible Force Meets an Immovable Object: Designing a Two-Way Video Advanced Placement Course for High School and College Students* . . . 13

**Janis H. Bruwelheide, Ed.D.,** Montana State University
*Web Resources and the Super Five: Critical Evaluation of Information and Tools* . . . 25

**Deborah D. Canter, Ph.D., RD, LD,** Kansas State University
*Delivery of a Dietetics Degree Program by Distance Education* . . . 27

**Lauren Cifuentes,** Texas A&M University
**Karen Murphy,** Texas A&M University
**Trina Davis,** Jones Intermediate School
**Ester Gonzales,** Berta Cabaza Middle School
**Chris Edmundson,** VTEL Corporation
*Cultural Connections: A Model for K–12 Videoconferencing* . . . 33

**Mauri Collins,** Northern Arizona University
**Zane Berge,** University of Maryland
*Student Attitudes About Computer Conferencing Used as a Supplemental Delivery System* . . . 37

**Mauri P. Collins,** Northern Arizona University
**Karen L. Murphy,** Texas A&M University
*Reducing Conversational Chaos: The Use of Communications Conventions in Instructional Electronic Chats* . . . 43

**Rita-Marie Conrad,** Florida State University
*Save Yourself From Drowning in Online Interaction* . . . 51

**Thomas E. Cyrs, Ed.D.,** New Mexico State University
*Wrap Your Key Points in a Story: Storytelling for Interactive Television* . . . 55

**Dr. William J. Daughton,** University of Colorado at Boulder
*The Enrichment of the Learning Experience of Remote Students Through Modern Communication Technology* . . . 59

**Shirley Davis,** PBS Adult Learning Service
**Elana Cohen,** League of Women Voters Education Fund
**Elizabeth Kraft,** League of Women Voters Education Fund
**Jane Smith,** League of Women Voters of Ashland Bayfield County
*Anatomy of a Nationwide Collaborative Based on a Satellite Event* . . . 65

**Sandra A. Dirks, RN, MSN,** University of Wisconsin—Eau Claire
**Sharon R. Nellis, MPA,** University of Wisconsin—Madison
*Helping Students Through the Hoops: Advising in a Distance Education Program* . . . 73

**Dr. Donald Elder,** Eastern New Mexico University
*Cutting Off the Talking Head: Multidimensional Presentations in the Distance Education Classroom* . . . 77

**Paul P. Freddolino, Ph.D.,** Michigan State University
*A General Model for Evaluating Distance Education Programs* . . . 81

**Julie A. Furst-Bowe, Ed.D.,** University of Wisconsin—Stout
*Delivering a Graduate Program via Distance Learning Technologies: A Collaborative Approach* . 87

**Bee Gatliff,** University of Nebraska-Lincoln
*Institutional and Instructional Collaboration in Distance Education: Pitfalls and Promises* . . . 93

**John H. Gebhardt,** John Wood Community College
*Community College/High School Distance Learning Connection and Collaboration* . . . 99

**Karen Hallett, Ph.D.,** Indiana University, Bloomington
**Jack Cummings, Ph.D.,** Indiana University, Bloomington
*The Virtual Classroom as Authentic Experience: Collaborative, Problem-Based Learning in a WWW Environment* . . . 103

**Kevin G. Hayes, Ed.D.,** Oklahoma State University
*The Meaning of Policy for Distance Delivery in Higher Education* . . . 109

**John J. Hirschbuhl,** University of Akron
**Dwight Bishop,** University of Akron
**Valerie Frear,** University of Akron
*Effects of Computer-Based Interaction on Learners in a Virtual Classroom* . . . 115

**Carol F. Hobaugh,** U.S. Army Medical Department Center and School
*Interactive Strategies for Collaborative Learning* . . . 121

**Don Icken,** IBM T.J. Watson Research Center
**Edward Colet,** IBM T.J. Watson Research Center
**Neal Keller,** IBM T.J. Watson Research Center
**Lisa Ungar,** IBM T.J. Watson Research Center
*Lotus Notes Based Distance Education at the IBM Watson Research Center* . . . . . . . . . . . . . . . . 127

**Bonnie M. Jordan,** Charles Bailly & Company P.L.L.P.
*Designing Interactivity Into Satellite Training* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 135

**Elizabeth T. Joseph,** Ed.D., Slippery Rock University
**Judy Pezzulo,** Greenville Area School District
*Collaborating to Integrate Technology Into the Secondary Science and Math Classrooms* . . . . . . . 139

**Ronald J. Kantor, Ph.D.,** University of Houston Clear Lake
*The Tension Between Collaboration and Collusion Within-Site in a Distance Learning Community* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 145

**C. Paul Kasten,** Budget Rent a Car Corp.
**James W. Davis,** Budget Rent a Car Corp.
**Charles McKinney,** Budget Rent a Car Corp.
*An Organization's Response to a Distance Learning Initiative* . . . . . . . . . . . . . . . . . . . . . . . . . 153

**Neil R. Kestner,** Louisiana State University
**Randall W. Hall,** Louisiana State University
**Leslie G. Butler,** Louisiana State University
**Patrick A. Limbach,** Louisiana State University
*Cooperative Efforts to Simplify Web Page Instruction* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 157

**Kevin Kruse,** Advanced Consulting, Inc.
*The Promise and Perils of Web-Based Training* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 165

**Heikki Kynäslahti,** University of Helsinki
**Seppo Tella,** University of Helsinki
*Collaboration of Schools With Distinct Characters in Networks of Schools* . . . . . . . . . . . . . . . . . 169

**John H. Laflin,** Dakota State University
**Molly Turner-Lammers,** Dakota State University
*One Size Technology Does Not Fit All: Upper and Lower Level Undergraduate Courses on the Internet* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 175

**Cissy Lennon, Ph.D.,** Federal Aviation Administration
**Hank Payne,** Federal Aviation Administration
*A Comparison Between IVT and Resident Versions of FAA's Quality Assurance Course* . . . . . . 181

**Marilyn A. Lester, Ph.D.,** West Suburban Post-Secondary Consortium
**Patricia R. Widmayer, Ph.D.,** North Suburban Higher Education Consortium
*Urban Distance Learning: The Chicago Metro Area's First Four Years as Part of the Illinois Higher Education Telecommunications Network* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 187

**Barbara B. Lockee,** Virginia Tech
**J. Thomas Head,** Virginia Tech
*NET.WORK.VIRGINIA: Forging New Partnerships in the Information Age* ................ 193

**Dr. Roy Lundin,** Queensland University of Technology
*Flexible Delivery of Continuing Professional Education: Models, Issues, and Trends* .......... 197

**Kay Mac Keogh,** National Distance Education Centre, Ireland
*Distance Higher Education Policies in Europe: Cooperative and Competitive Approaches* ...... 203

**James R. Mallory,** National Technical Institute for the Deaf/Rochester Institute of Technology
*Developing Accessible Distance Learning Instruction for Special Needs Students in Education and Industry* .......................................................... 213

**Susan R. McIntyre,** University of Wisconsin—Eau Claire
**Kathy Finder,** University of Wisconsin—Eau Claire
*Providing for Professional Development in Instructional Technologies Using Distance Education* .......................................................... 217

**W. Wade Miller,** Iowa State University
**Gregory S. Miller,** Iowa State University
*Staff and Faculty Development for Agricultural Distance Learning Programs at the Collegiate Level* .......................................................... 223

**Nancy Millichap,** Indiana Higher Education Telecommunication System
**Ann Holcombe,** Indiana Higher Education Telecommunication System
*Distance Education Collaboration Across Indiana: The Indiana College Network* ............. 227

**Tim H. Murphy,** University of Idaho
*An Evaluation of a Collaborative, Location-Neutral Course Design* ........................ 233

**Malcolm D. Patel,** Universal Systems Inc.
**Elizabeth T. Volk,** Universal Systems Inc.
*Designing for the Web: Integrated Independent and Collaborative Learning on the Internet* ..... 239

**Dr. Lynn W. Payne,** Langston University
**Mr. Hank Payne,** Federal Aviation Administration
*The Problem of Interaction at a Distance for Video Teletraining* ........................... 247

**James B. Pettijohn,** Southwest Missouri State University
**Douglas E. Durand,** University of Missouri—St. Louis
*Preparing Information Systems Professionals for Managerial Roles: A Computer-Conferenced Masters Degree Program* .......................................................... 253

**Monica W. Pilkey,** American Association of Community Colleges
*User Friendly Teleconferencing at the Community College* ............................. 259

**Michael Pitterle, M.S., R.Ph.,** University of Wisconsin—Madison
**Connie Kraus, Pharm.D.,** University of Wisconsin—Madison
*Use of Distance Learning Technology in Linking Academic and Community-Based Learning Environments* . . . . . 263

**Dr. Kim Ragland,** University of Kentucky
*Partnering Universities and Public Television to Deliver K–12 Programming* . . . . . 267

**Timothy Ropel,** Compuware Corp.
*Preparing Print-Based Distance Learning Materials in the Age of the Web: 34 Tips for Effective Typography, Page Design, and Structured Content* . . . . . 273

**Cynthia Rowland, Ph.D.,** Utah State University
**Sarah Rule, Ph.D.,** Utah State University
*Using Interagency Collaboration and Combined Technologies to Deliver a Rural Teacher Certification Program* . . . . . 283

**Shen Ruimin,** Shanghai JiaoTong University
**Chen Wei,** Shanghai JiaoTong University
**Zhu Yuhong,** Shanghai JiaoTong University
*A WWW-Based Learning and Discussion System* . . . . . 289

**James E. Sherwood, Ph.D.,** University of Nebraska—Lincoln
**Charlotte Hazzard,** University of Nebraska—Lincoln
*The CLASS Project After Year One* . . . . . 297

**Nancee Simonson,** The Bureau of National Affairs, Inc.
*Design Considerations in Converting a Standup Training Class to Web-Based Training: Some Guidelines From Cognitive Flexibility Theory* . . . . . 301

**Joan Spillner,** South Central Instructional Network Group
*Partnerships That Work* . . . . . 313

**Melissa M. Spirek,** Bowling Green State University
**Anthony E. Short,** WBGU TV-27
*Strengthening the Connections for Successful Collaborations Between Distance Learning Providers and External Evaluators* . . . . . 317

**Jan Sweeney,** Andersen Worldwide SC
**Colleen Roop,** Andersen Worldwide SC
**Sherry Lazzarotto,** Andersen Worldwide SC
*Teaching Soft Skills Using Distance Education: A Comprehensive Evaluation of a BTV/OT Program* . . . . . 323

**Jennifer Townsend,** Iowa Public Television
**Wayne Bruns,** Iowa Public Television
*A Light to the Future: Distance Learning in Iowa* . . . . . 331

**A. J. Turgeon,** Pennsylvania State University
**Donna J. Brown,** University of Illinois
*Problem-Based Asynchronous Learning Resources for the Web* ............................ 335

**Judith van Duren,** Athabasca University
*Transforming a Traditional Distance Education Organization: Athabasca University Faces the Challenge* ............................ 341

**Timothy J. VanSusteren, Ph.D.,** University of Florida College of Medicine
**Alan W. Brue, M.A.E.,** University of Florida College of Medicine
*Rules of Thumb for Designing Interactive WWW Based Learning Modules: Lessons From Continuing Medical Education* ............................ 345

**Beth Walden,** Utah State University
**Byron Burnham,** Utah State University
*Interactive Connections in the Classroom From the Students' Point of View: What Happens, What Helps* ............................ 349

**Ellen Welty,** Arizona State University East
*The Contribution of Electronic Libraries to Distance Education and the Contribution of Distance Education to Electronic Libraries* ............................ 355

**Dr. Frank L. Whetten,** Embry-Riddle Aeronautical University
**Dr. Andrew Kornecki,** Embry-Riddle Aeronautical University
*Distance Teaming: A Distributed Undergraduate Program in Computer Engineering* ......... 361

**Linda L. Wolcott, Ed.D.,** Utah State University
*Distance Teaching and the Culture of Institutional Rewards* ............................ 365

**Thomas E. Wolfe,** Air University
*Air Force Collaboration With Interactive Television* ............................ 373

**Jane Zeiss, M.S.Ed.,** Andersen Consulting
**Ted Carpenter-Smith, Ph.D.,** Andersen Consulting
*Collaborative Learning Meets Knowledge Management in the Virtual Classroom* ............. 381

**Ali R. Zohoori, Ph.D.,** State University of New York
*Teaching on Television From Concept to Evaluation* ............................ 387

## Tutorials & Workshops

**Joel P. Bowman, Ph.D.,** Western Michigan University
*It's Show Time: Preparing for Teaching on TV* ............................ 395

**Dr. Patricia Ann Brock,** Raritan Valley Community College
*Collaboration or Competition? The Influence of Diversity on Distance Education* ............. 401

**Janis H. Bruwelheide, Ed.D.,** Montana State University
*Intellectual Property and Copyright Issues: Yours? Mine? Ours?* . . . . . . . . . . . . . . . . . . . . . . . . 405

**Norman Coombs, Ph.D.,** Rochester Institute of Technology
**Richard Banks,** Equal Access to Software & Information
*Are Disabled Students Caught in Your Web?* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 407

**Thomas E. Cyrs, Ed.D.,** New Mexico State University
**Jean D. Conway, M.A.,** New Mexico State University
**John P. Shonk, M.A., M.Acct.,** New Mexico State University
**Susan Jones, M.A.,** New Mexico State University
*See, Jane, See: Communicating Beyond Words* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 411

**Kim Dooley, PhD,** The Texas A&M University System
**Chris Edmundson, MS,** VTEL Corporation
*Teaching Science at a Distance: It's Not as Far as You Think!* . . . . . . . . . . . . . . . . . . . . . . . . . 417

**Alice F Gay,** The University of Georgia
**David A. Silvian,** The University of Georgia
*Collaborative Efforts in Higher Education: Improving Distance Learning in Interactive Satellite Teleconferences* . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 425

**Richard A. Harrison,** San Diego County Office of Education
*12 ACRONYMS for Successful VideoConferencing or Distance Education Presentations* . . . . . . 429

**Dr. Dale Huffington,** University of Missouri
**Dr. Margaret Gunderson,** University of Missouri
**Nancy Thompson,** University of Missouri
**Justin Lyon,** ArachNet Web Publishing, Inc.
**Amy Wissman,** ArachNet Web Publishing, Inc.
*Designing and Developing Courses for Internet and World Wide Web Delivery* . . . . . . . . . . . . . . 439

**Nan L. Kalke,** University of Minnesota
**Joseph G. Massey,** University of Minnesota
**Thomas B. McRoberts,** University of Minnesota
**Billie V Strand,** University of Minnesota
*How to Improve Interactive Video Courses: Lessons Learned From Successes and Failures* . . . . . 451

**Howard T. Major, Ed.D.,** Grand Valley State University
**Nancy M. Levenburg, Ph.D.,** Grand Valley State University
*Designing Multiple-Technology Distance Education Programs That Work!* . . . . . . . . . . . . . . . . . 457

**Richard Schafer**
*Implementing the Principles of Learning and Teaching at a Distance Using Flexible Learning* . . 463

**Beth Walden,** Utah State University
**Byron Burnham,** Utah State University
*Designing Instruction Based on Naturally Occurring Interactions* . . . . . . . . . . . . . . . . . . . . . . . 465

# ❖ Information Sessions ❖

# Delivering Statewide Computer Training via Satellite

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Learning Support Services

## Background

The University of Wisconsin Cooperative Extension has faculty and staff in each of Wisconsin's 72 counties. They rely heavily on computer training and support in order to keep up with technological changes, maintain their competitive edge, and carry out the Wisconsin Idea—using research-based information to meet the needs of individuals and communities in Wisconsin and beyond.

Alice Anderson and Lisa Jansen were part of a team that delivered four statewide computer training programs in 1996 and 1997. Evaluation results from these programs have led to changes and improvements and a working model for future training efforts.

## A Model for Delivering Statewide Computer Training via Satellite

### Committed Team

- Design team
- Site facilitators
- Production team
- Technical support for all phases
- Supportive administration, with budget

### Access to Infrastructure

- Easy access to satellite downlink sites
- Uplink facility
- Studio and crew, videographer, video editor, video duplicating

### Effective Instructional Design

**Knowing your learner**
- Scheduling
- Learning styles

**Communication of program content**
- Identify and communicate prerequisites

**Essential video elements**

- Mix of live and pretaped segments
- Lots of "how to" screen shots
- Opportunities for interaction between content specialists and learners
- Instructors comfortable with medium

**Supportive print materials**

- Facilitator and participant program guides
- Follow-up exercises
- Evaluation

## Issues for Further Discussion

Skill retention
Video tape vs. live satellite delivery
Learner preferences
Murphy's Law
Copyright
Longitudinal studies

## Site Coordinator Evaluation Summary

**World Wide Web Search Strategies**
Satellite Videoconference, January 29, 1997

Registered sites: 78
Estimated number of participants: 400
Number of sites responding: 25
Participants at sites: 9 average; high 36, low 1
Technical problems: 25% yes; faxes not received—instead, my call went somewhere else in the building. Finally reached a real person and got my fax to the presenter, with no opportunities to re-fax. ETN difficult to hear. Picture out of focus at times. Snow on dish with ice that couldn't be removed.
Facilitator packet: 100% received with adequate time for preparation. Material was good. On a scale of 9, with 9 being very useful, the packet was rated as 9.

### Program Strengths

- Very organized and pace was easy to follow
- Pre-program preparation/print materials and exercises
- Presenters were credible and knowledgeable, clear and easy to follow
- Very informative for beginners, good tips for those with some experience
- Good use of computer screen
- Program as both a demo and question/answer session (between panelists as well as viewers)

### Program Weaknesses

- None
- Computer language too much for some people; demo on computer a bit disorienting when zooming out and in.
- Until we actually apply everything talked about, we won't realize its full potential frustration of not being able to be on computer when learning. I prefer to use tape, then have an ETN time at my computer to follow up with questions within a short time period.

### Additional Comments

- Excellent conference, well done
- Great opportunity to learn and become efficient
- Good method for computer training. Liked question and answer segments.
- This is better than live face to face training in the sense that it can be taped and a person can slow down, review or stop to make hands on applications.
- You did a great job, thanks for your patience with us.

## Participant Evaluation Summary

### World Wide Web Search Strategies

Satellite Videoconference, January 29, 1997

Registered sites: 78
Estimated number of participants: 400
Number of participants responding: 113
Overall rating of the program: 74% Excellent; 24% Very Good; 2% Fair; 0% Poor

### Most Valuable Part of the Videoconference

- Precise/concise manner in which information was presented
- Panel actually walked you through the steps so we can see how to access specific information.
- Question and answer periods; participant packet, written material to go along with video; Boolean searching, Alta Vista, URL, overview of WWW
- Excellent presenters; good conversational style, useful extra tips, pace good on presenting concepts, the presenters complemented each other and appreciated the summaries presented by Lisa

### Least Valuable Part of the Videoconference

- All good
- Question and answer section
- Terminology use, jargon, computer language

### Program Comments

| | 1<br>not at all | 2 | 3 | 4 | 5<br>very |
|---|---|---|---|---|---|
| Section I | | | | | |
| Understandable | 0% | 4% | 16% | 48% | 32% |
| Useful | 0% | 3% | 15% | 46% | 36% |
| Section II | | | | | |
| Understandable | 0% | 3% | 15% | 51% | 31% |
| Useful | 0% | 1% | 13% | 46% | 40% |
| Section III | | | | | |
| Understandable | 0% | 7% | 22% | 47% | 24% |
| Useful | 0% | 6% | 16% | 52% | 26% |
| Section IV | | | | | |
| Understandable | 1% | 8% | 24% | 46% | 21% |
| Useful | 1% | 12% | 20% | 43% | 24% |
| Section V | | | | | |
| Understandable | 0% | 6% | 36% | 44% | 14% |
| Useful | 0% | 11% | 26% | 37% | 26% |

Section I: Defining Your Topic, Refining Your Search, Opening Known URL's and Browse Links, Finding Information Arranged by Subject
Section II: Using Search Engines Effectively
Section III: Finding and Using Subject Specific Databases
Section IV: Finding and Using Bibliographic Databases
Section V: Find Information by Geographical Location, Find Information by Type of Service, Evaluate Quality of Information

Overall rating of the video production: 40% Excellent; 44% Good; 16% OK; 0% Poor.
100% indicated the participants packet helped follow the videoconference.
100% said videoconferences should be used for similar topics/areas in the future.

### Autobiographical Sketches

**Alice Anderson** is the Instructional Designer with Cooperative Extension's Distance Education Unit. Alice has been designing satellite videoconferences since 1994 at the Distance Education Unit and other distance education programs since 1980 at the University of California, Davis and Southwest Wisconsin Technical College. She has an advanced degree from the University of Wisconsin, Madison, and an undergraduate degree from the University of California, Davis.

**Lisa Jansen** has provided computer training and support to University of Wisconsin faculty and staff since 1987. She is currently the Microcomputer Training Coordinator for Learning Support Services in the College of Letters & Science, University of Wisconsin-Madison. She held a similar position at University of Wisconsin-Extension, Cooperative Extension, Wisplan Computer Services, coordinating training across the spectrum of hardware and software applications. Her journalism degree from the University of Wisconsin enhances her ability to teach technical subject matter in a clear, concise manner.

To order a copy of *WWW Search Strategies* (VA1037) or *Improve How You Deal With Eudora* (VA1038) videotape and print practice exercise, contact University of Wisconsin-Extension Publications, 630 W. Mifflin Street, Madison, WI 53703, Voice (608) 262-3346, Fax (608) 2625-8052, E-mail: Breitzman@admin.uwex.edu. Tapes are $29.95 each, plus tax and shipping.

# International Business Education: The Integration of Asynchronous and Synchronous Learning

Michal Beller
Ehud Or
The Open University of Israel

Ronald Tuninga
Open University of the Netherlands

## Abstract

Business organizations, which once were growing rapidly, now are struggling to remain competitive in the global market. Many of the skills needed by today's contingent workers are associated with technological change and globalization. The world is a system in which technological, ecological, economic, social, and political issues can no longer be effectively understood from a national perspective because the issues transcend national borders. We make choices that affect other people around the world, and others make choices that affect us. The challenge to educators is to provide graduates who are competent not only to function professionally in an international environment, but who are equipped to make personal and public-policy decisions in an international society.

Many students are ill-equipped to take an effective role in the international community because they can not communicate in foreign languages and understand other cultures and value systems. However, cultural differences are very much a part of international trade and global competition and companies that are currently in, or would like to engage in, international trade must adapt to foreign cultures; this requires an understanding of national and individual environmental factors.

Managers need the ability to communicate effectively in global markets and a sensitivity to individual and cultural differences. Successful intercultural communication includes an awareness of the education, laws, regulation, economy, politics, religion and language, and an awareness of world events and an understanding of their significance in the global marketplace. Different attitudes toward food, alcohol, social graces and nonverbal communication and differences in business correspondence also must be recognized. Fortunately, more and more managers are beginning to understand that with the world integrated by economics, communications, transportation, and politics, that we live and work in a global marketplace of goods, services, and ideas. Conventional education cannot be fully responsive to the global education needs.

Open universities, as well as other distance learning organizations, face an exciting challenge: How to deliver personalized, easily updated, performance- focused, learner-controlled multimedia learning tools and information to the desktop, the office or the student's home, as well as to study centers and laboratories.

This challenge is currently met by integrating technologies into the following three modes of distance teaching (Miller, 1995): Independent Learning Telecourses and Multimedia courseware, Distributed Classrooms (Interactive Distance Learning delivered via satellite to many remote sites), and Learning Community (Computer Mediated Studies and Informatics).

As distance education has evolved, so too have the roles of student, teacher and institution in the system. Distance education no longer has a distinct pedagogy common to all its forms. The pedagogy of synchronous remote-classroom teaching resembles the pedagogy of classroom teaching more than that of traditional asynchronous correspondence teaching (Daniel, 1995). The development of the proper pedagogy most suited to each mode of distance education remains a challenge.

This paper will present an integrated learning environment which is based on the experiences of the Open Universities of Israel and the Netherlands. An integrated learning environment, based on an effective integration of all three modes of distance teaching could be the basis for an integrated learning environment. The idea is aimed at converging synchronic and asynchronic modes of communication into a cohesive and coherent resource-based learning environment.

This approach could be beneficial to the development of a an international business program. Such a program would offer standardized courses and courses adapted to local circumstances. The standardized courses provide a common core of knowledge in International Business for all students, irrespective of the country in which they live and work. For example at the Open University of the Netherlands courses were developed by team of subject area specialists from many countries. For example, the International Human Resource Management course was prepared by faculty members from universities in Germany, the Netherlands, New Zealand and the United Kingdom. Industry representatives from Germany, the Netherlands, and Sweden also participated. Educational experts experienced in the preparation of self-learning material also are involved in course development.

The courses also have been developed in the context of a program of study and the course structure is designed to provide an integrated whole. Following an introductory course is a second tier consisting of courses examining the environments of decision making—economic institutions, international trade and economic integration. A third tier of courses develops skills in functional areas. A final course, consisting of a computer simulation, offers students the opportunity to make decisions that integrate knowledge of environmental issues and functional areas.

The local context for a international business program could be provided by integrating asynchronic distance learning and synchronic learning tailored to a specific group of students. Because several of these programs could be offered concurrently, yet another dimension can be added to international business education by developing links among them (electronic exchanges in both asynchronic and synchronic learning modes).

## Distributed Classrooms

The Open University of Israel has established its instruction program via satellite, creating an extensive outreach throughout Israel. The pace of learning and the material is instructor/institution based, and spontaneous on-line interaction may occur. The Open University of Israel's approach to the distributed classrooms mode is based on interactive satellite communication. Their OFEK (meaning HORIZON in Hebrew) system, is a system for interactive distance learning via satellite. The system enables a lecturer to deliver a "live" lesson from a central studio concurrently to any number of classrooms within the foot-print of the satellite. The lesson is transmitted from a central studio to the satellite as a compressed digital video signal addressed only to the classrooms that are selected and ready to receive it. The students in these remote classrooms can participate in the lesson by means of voice communication and data communication. Instruction via OFEK provides the lecturer with the most advanced aids and technological means to improve the quality of instruction and the internalization of new knowledge by the students.

The Open University of Israel has established its instruction program via satellite, creating an extensive outreach throughout Israel. A broadcasting system was set up at the main campus. It comprises a central computer and two studios fully equipped to process a broad range of visual information. This consists of three video cameras, two PCs and a Mac computer used for computations and multimedia presentations, a special writing board, a color scanner, audio sources, CD and tape. Classrooms throughout the country are equipped with computerized monitoring systems and telephones enabling students to speak to the lecturer at the center and to enter their computerized responses.

## Asynchronic Learning and Groupware (Lotus Notes)

In this information session it will be demonstrated how the use of modern information and communication technology and groupware (Lotus Notes) software provide an active distance learning environment which not only copies the conventional classroom but adds new dimensions necessary for the manager in the international economy.

The information session will demonstrate Lotus Notes as a communication device for students and instructors and the set-up of international business distance learning courses. Groupware is also an important tool, especially when work by students in groups at a distance is desirable. This information session demonstrates this use for a particular field of study, but a broader application is possible.

The Open University of the Netherlands' International Business courses are offered to students in various countries. Students must be proficient in English; the course materials are written in English, students communicate with one another and with the instructor in English, and all written work is submitted in English.

In these courses each student is a member of a team composed of three or four students, some of whom may be located in different countries.

## The Integrated Educational Technology Environment

Further developments are on the way to integrate the asynchronic and synchronic learning environments. A R&D project aims at developing innovative learning environments with the intent of combining the benefits from all existing technologies and modes of distance teaching. A large scale R&D project aims at developing innovative learning environments with the intent of combining the benefits from all existing technologies and modes of distance teaching. The focus is on developing the necessary instructional and educational foundations for tomorrow's state-of-the-art learning centers, and that of the learning environment at home and at the work place. All of the above are required in a society in which Life Long Learning (LLL) has become a necessity. The goal of the project is to build a high-quality, well-integrated learning environment, consisting of both synchronic and asynchronic interaction for facilitating resource-based, self- and collaborative-learning.

## Conclusions

Distance learning, using new developments in information and communication technology, is becoming a key educational technology, especially for international business learning. Distance asynchronic and synchronic learning can be combined to optimize the learning experience, either in individual courses or complete programs. Acquiring a common core of knowledge in international business and developing needed skills will help students of this program to contribute to organizations that must be competitive in the global economy.

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# An Irresistible Force Meets an Immovable Object: Designing a Two-Way Video Advanced Placement Course for High School and College Students

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## Introduction: An Irresistible Force Meets an Immovable Object

One of the most sought-after connections between colleges and high schools in today's environment is to provide "School-to-Work," 2+2, dual credit or advance placement courses to high school students for college credit. While two-way video creates an ideal delivery system for such an endeavor, the irresistible force of advance placement plus advanced technology has interesting consequences when technology meets the immovable object of high school and college block scheduling, logistics and "culture." The "dance" of collaboration which results in a successful course presents a design and delivery challenge. This paper presents the collaboration efforts and design strategies used to deliver a two-way technical course, ELT 103 Digital Principles, between a two-year technical college and three area high schools. Twenty-six students were enrolled in this electronics course in Spring 1997.

## The Irresistible Force: School-to-Work and Advanced Placement Education for College

### Background of the Project

**The college.** In October 1995 Ivy Tech State College received a grant from the Corporation for Educational Communications, the non-profit arm of Ameritech. This enabled Ivy Tech State College to apply its resources and expertise in technical/occupational and postsecondary education toward providing two-way video interactive programming for faculty, staff and students in participating Northern Indiana secondary schools through two-way video. Responding to a stated need for "Programming for technology education" and "Tech Prep/School-to-Work Transition," Ivy Tech and the high schools selected a "Digital Principles" electronics technology course to pilot the program.

Ivy Tech State College Northcentral region has been providing live one-way video distance education for over five years, via both ITFS microwave and IHETS satellite broadcast. Ivy Tech, on its own cable channel, has provided live video instruction of approximately 15 courses a semester to its own instructional sites in its region and into area homes via cable.

In the past four years, Ivy Tech has offered dual credit and advanced placement coursework with area high schools following the guidelines of the School-to-Work initiatives. Articulation agreements have been signed with more than 25 schools. Through the availability of both one-way and two-way video delivery systems, the interaction level can now suit the needs of the instructor and student. With a college-level course offered between

Ivy Tech and participating schools, students can more readily achieve advance placement. Three out of the eight connected high schools were the first to sign up to take the Digital Principles course. They included a large suburban public school, an urban public high school and a private high school.

**The high schools.** Of the three high schools which took part in this pilot course, the large suburban high school had the most technological advantages, with its own electronics department and instructors, and its two-way video room set up only for two-way viewing. The urban high school, while large, had a technology department but no electronics specialty, and shared its two-way classroom with regular on-campus classes. The private parochial school had no technology instruction base, a quarter of the student population of the other two, and shared its two-way classroom with the computer lab. While this dual credit course was one among several for the two public high schools, it was a first for the private school. None of these schools had operated the new two-way system outside of testing.

## The Immovable Object: High School Systems and Culture

### Systems and Culture

Both Ivy Tech and the high schools entered the collaboration aware of many differences in systems and cultures, from the semester start and end dates to student disciplinary procedures. Ivy Tech adjusted the start of its ELT 103 course start, moving it up a week to accommodate a common start time. The high schools adjusted to the end of the College's 16 week semester by arranging study hall activities for the students until the end of their school year. It was decided that, because this is a college course, all grading scales and procedures were the domain of the instructor, while student disciplinary procedures was the domain of the individual high school coordinators, although the instructor had all procedures provided him. All student forms such as "drop/add" came through the instructor to the college and were copied to the high school coordinator, although only two Ivy Tech students and three high school students dropped out of 26 students.

### Scheduling Patterns

The first test of the collaboration came with discovering the many ways a high school can schedule its time. One high school was on a daily, one-hour scheduling system, while a second high school had a block scheduling system that corresponded to Ivy Tech's two-hour block/two days a week, with a Friday block for study. The third high school, while having a block scheduling system, rotated its block every other week, so that one week, a class would be Monday and Wednesday, while in the alternating week it would be Tuesday and Thursday. At first, this seemed an immovable object that would wreck the entire continuity of the class, and make it virtually impossible to do a commonly scheduled course.

This was solved through some design changes within the course structure and the availability of video taping. The instructor visited each high school and presented from that high school's two-way system during the class time, then worked with the students after the other sites had "tuned out." The student handbook also carefully took each school through its schedule (example below).

**Example of Weekly Schedule in Handbook—ELT103—Digital Principles Spring Semester, 1997**

| **Week 4** | **Mon 2/10** | **Tues 2/11** | **Wed 2/12** | **Thurs 2/13** | **Fri 2/14** |
|---|---|---|---|---|---|
| **Ivy Tech** | Chp. 4: 1, 2, 4, 6 | Phone counseling available 1–3 | Lab #3 Chapters 3:6 and 4:6 | | Phone counseling available 1–3 |
| **Mishawaka** | LIVE 1–3 | Phone counseling available 1–3 | LIVE 1–3 | | Phone counseling available 1–3 |
| **Marian** | LIVE 1–2<br>RECORD 2–3 | PLAYBACK 2ND HALF OF 2/10 CLASS | LIVE 1–2<br>RECORD 2–3 | PLAYBACK 2ND HALF OF 2/12 CLASS | Phone counseling available 1–3 |
| **Penn "Black"** | RECORD 1–3 | PLAYBACK 2/10 CLASS<br>Phone counsel | RECORD 1–3 | PLAYBACK 2/10 CLASS<br>Phone counsel | RECESS |
| **Assignment due** | | | CHAP. 3 | | |
| **Test Date** | | | | TEST #1 | TEST #1 |

*Special Notes:* Ivy Tech students sign-up a time to take TEST #1 in the PRC, Thursday OR Friday. Mishawaka students test in class on either Thursday OR Friday. Marian students test in class on Friday. Penn students sign-up a time to test next Tuesday in the Educ Svcs Center. INSTRUCTOR AT MISHAWAKA NEXT WEDNESDAY, 2/19!

While the various high school and college scheduling policies were immovable, they each provided a strength to their students and to the course. In effect, each high school was able to "format" the College course into their rhythm, better suiting the needs of their own students. Two schools used the Friday period for students to do their electronics homework, and for a question period via phone with the College instructor. Each school used the session tapes in the "library" format to allow students to review.

## Collaboration Strategies

### Objectives and Strategies

Ivy Tech's overall objective was to provide regional secondary institutions with the support of career guidance, technological training, and quick response to their School-to-Work curriculum needs. While the project focuses on some occupation preparation and involvement in technology, lessons learned from project applications will be applied to other content areas of interest to schools.

Ivy Tech's second objective was to promote collaboration among the region's schools and communities for the successful implementation of School-to-Work goals. Through expert speakers, workshops and seminars presented on two-way video, schools are encouraged to "network" more through the medium to rapidly disseminate new techniques, ideas and approaches.

Both Ivy Tech and the high schools shared the strategy of "quick response," providing an example course as quickly as possible to test the technology, to show the possibilities, and to get experience in the design of such collaborative courses. Immediate student involvement in the technology was imperative to test the system.

The major collaboration planning strategy was a series of stakeholders' meetings begun when the high schools committed to offering the course. This group began as eight high schools, but when enrollment came in, only three high schools had enough to justify the course. These meetings included the high school site coordinators who were the technical two-way video supervisors, some high school technology or electronics instructors, and initially some vice-principals. In this way, the system and culture differences at all levels were quickly encountered. These meetings continued throughout the course, either in person or by phone, to deal with problems or changes needed.

### Taking the Lead in Training for Two-Way

The group of high schools and post-secondary institutions involved in building the two-way system with Ameritech had been working over a year to operationalize the plan of connecting via fiber optics. When the system moved into its operational phase, Ivy Tech was one of the first to obtain a "Content Provider" grant from the CEC to provide coursework. With the help of the grant, Ivy Tech brought students from most of the participating high schools together for a summer "Video Assistants' Workshop," which prepared them to aid their own high school coordinator with the technical set-up and aid for instructors wanting to use the system. In this way, the site coordinators would have the base they needed to support two-way events. This early collaboration and training, with the assistance of Ivy Tech's instructional designer, formed a communications linkage that allowed open discussion on needs, schedules and the logistical needs of the high schools.

### Use of Ivy Tech Experience in Distance Course Design

Ivy Tech's Instructional Technology Department, with both its ITFS microwave cable channel and satellite broadcast, provides live video instruction of approximately 15 courses a semester to its own instructional sites in Elkhart and Warsaw, and into area homes via cable. Having designed and developed more than 50 courses for one-way television on the Ivy Tech one-way system, the instructional technologist and instructional designer brought a proven effective design model for distance, with the exception of the two-way video element. The doctorally-prepared Instructional Technologist brought over ten years of distance education experience to the project, and the instructional designer has a master's degree in IST, and many years of technical television production experience as well. Instructional design for two-way video was researched, and major elements brought into the design of the course. The course itself, ELT 103 Digital Principles, had been delivered via one-way television for two years, so the expectation was that bringing it to two-way video would be faster, and allow it an "easier" delivery system in which to operate. Therefore, the course was not completely redesigned, but modified for two-way interaction and to accommodate high school students.

### Showing Long-Term Support for the Two-Way System

The two-way video system is still in its initial grant phase, and while immediate activity on the system was needed, a view towards the long-range was also imperative. Ivy Tech State College wanted to show its long-range commitment to high school advanced placement, dual credit, to distance education, and the two-way fiber optic video system. On-going long-term connectivity to area secondary schools for both dual credit/advance placement college courses and adult education has been one of the goals of Ivy Tech's distance system.

The high schools, while committed to the long range possibilities of two-way video, had a longer turn-around in developing collaborative courses for two-way video, and had the goal of quickly providing some examples, evaluation and "stimulation" of interest in the system. Through the College's willingness to quickly develop a course for the two-way system , it allowed everyone to explore and examine the possibilities of collaborative courses without waiting for them to happen through the "system."

## Design Strategies

### Basic Elements of the Course

ELT 103 Digital Principles is a four-credit hour lecture/lab course introducing basic principles for digital electronics used in transistors, microchips and computer design and production. Both the lecture and the lab were done on two-way video. Ivy Tech provided a "training box" transistor "template" for every two students, and a lab kit of transistors and resistors to each student. The students worked in a pairs to solve the electronics problems presented, and wrote up a separate lab reports for their grades. The two-way system was set up to allow them to bring their box up to the document camera and show the instructor and other sites their results.

### The Design Model

A basic distance design model was used with a traditional instructional design model. While the instructional design model provided the "micro" design within the course itself, the distance model allowed a "macro" approach, to view the needs and interactions of the entire system. This model uses five categories in which to build a course:

- The capabilities and limits of the technical distance delivery system
- Course structure and organization
- Communications/feedback and interaction (dialog)
- Learner analysis and evaluation
- Student/site support

The "micro" design model also looked at the above elements at the strategic level within the course, using three categories of instructional strategies:

- Organizational strategies, relating to the structure of the course
- Delivery strategies, relating to the presentation of course concepts and materials

- ❖ Management strategies, relating to class management, interaction, feedback and site support

### Capabilities and Limits of the Technical Distance Delivery System

The two-way system is not a "dial-up" system, but must be scheduled in advance with Ameritech. Thus, the complication of the "static quad split" screen to show all four sites added to the complicated scheduling pattern discussed above. With a "static" split all sites can see each other, but everything is much smaller. Because the simplicity of the equipment includes a consumer-grade projection TV, the level of detail required for demonstration of small electronic components and complex flowcharts was a major concern.

To remedy this, it was necessary to schedule every session as a "dynamic quad-split." With this configuration it is possible to dial-in to the system computer and use the telephone key pad to send a full-screen image of any site to all other sites. However, this was not only somewhat cumbersome but also required the assistance of another technician to make judgements about what/when to switch back and forth. Equally frustrating is the need to juggle several remote controls, push-button video output switcher and camera placement.

In the course evaluation, the limits of the delivery system played heavily in dissatisfaction with the course, with audio the most pressing problem. Not only could the instructor not be heard clearly unless he spoke loudly, but various schools' P.A. announcements and class bells interrupted the flow of the course. Students could barely hear each other. This was rectified towards the end of the course by Ameritech's technical adjustments, but continues to be an area of concern.

### Course Structure and Organizational Strategies

Because logical ordering of content alone has been seen to be sufficient for learning, content organization and sequencing is the first instructional strategy to be determined. In short, simple skill instruction, students "organize as they go," and a "random" sequence of content presentation is adequate, but as the amount of content grows more complex and more than one procedure is to be taught, a logical sequence or ordering of instructional content is significantly more effective for learning (Reigeluth 1983).

Content organization/sequencing is the first step in building the instructional strategies within a given course. Even if no other strategies are chosen, an organized and logical content sequence will effectively instruct (Reigeluth 1983). Content sequencing is the ordering of the content according to a chosen logical path underlying the content structure to desired instructional goal from the first entry point of the content. Basically, there are four types of sequence paths for content organization:

- ❖ Procedural—do this first, then that
- ❖ Hierarchical—know greater principles, then lesser concepts
- ❖ Elaboration—overview, then simple to complex, like "zooming" in or out
- ❖ Relational—how does this relate to that—some examples include
  - – by association (by like attributes)
  - – by discrimination (by contrasting attributes)
  - – by chronological (temporal)
  - – by cause & effect

The course had originally undergone design for organization and sequencing for one-way video, and the same sequence was used, incorporating the text's hierarchical sequencing, but trying an elaborative sequence of simple to complex, summaries and analogies. The student handbook laid out the sequence in the course outline, detailed for dates, homework and testing time for each site, which could be slightly different, depending upon their school's daily schedule. The instructor prepared handouts for every major overhead he produced, so students had it clearly in hand, plus "structured notes" were produced to allow students to "fill in the blanks" during lectures and lab discussions.

In the evaluation results, structure seemed less clear to the students. They generally knew where they were going, why they were doing one section before another, and how things related to each other, but if the logic of the course structure would have been written into the course outline, or delivered by the instructor during the first session as an "advance organizer" (Heinich et al 1993), students would have perceived it more clearly. Students found that the course generally met the stated objectives and helped them understand, but stated objectives are not enough to provide this "advance organizer."

### Communications, Feedback and Interaction (Dialog)

The basic assumption of the designers was that two-way video, much more than one-way, enabled much easier dialog, feedback and interaction by its very nature, more like the traditional face-to-face classroom. Thus, in the redesign of the course for two-way, there was little emphasis on building in more planned interactions than already were in place. Such planned interactions included:

- Question and answer sessions at the end of each hour, before the break
- Homework and quiz review
- Having students demonstrate trainer box lab results to all
- Planned phone office hours for one-on-one consultation
- One or two site visits to each high school, presenting on two-way from each

However, in the course evaluation process, it was found that "natural" interaction and dialog does not occur that much more easily than on one-way. Learner interaction must be emphasized over the lecture. Presentation is but one form of interaction: instructor-to-learner. There are two other forms of interaction which must be planned and executed: learner-to-learner and learner-to-material (Moore 1989). The lab trainer boxes and kits provided hands-on discovery experiences which worked (lit up) if the students did the lab project correctly. This interaction proved successful, with the exception that students hesitated bringing their trainers under the document camera for all to see. This must be a positive experience for students, so mistakes can be made and shown without embarrassment. There must be a plan for students from different sites to talk to one another during the class, and possibly extra sessions with or without the instructor, between two or three sites, to discuss common problems and concerns, a "peer-to-peer" learning situation.

In addition, some types of interaction need to be planned and emphasized. Motivational interactions, even in a technical elective course, are essential. Students, in their evaluation, felt that the instructor did not motivate them to do their best work, even though the instructor was strongly perceived as "friendly." This motivational factor was even more interesting when one considers that this was an elective course for students who took it because it was in their field of interest, so intrinsic motivation was high. From the evaluation, however, students appeared to need more.

### Learner Analysis

The only formal prerequisite for the Digital Principles course was a demonstrated success in a basic algebra course (C or above). To ensure a common base of knowledge, however, high school students who had advance registered for the course were also tested by the ASSET test, the required entry test for all Ivy Tech students. The testing procedure was brought into the schools and provided to the students during certain study periods. Only by achieving a certain score on ASSET was the student officially admitted, and only one student failed to be admitted. Thus, prescreening ensured a certain basic math knowledge for all students coming into the course. Other prescreening was accomplished by demonstrated interest in the field of electronics and computer technology, and permission of the student's technology instructors. Another set of learner analysis questions during the first day of class asked student expectations of the grades they would receive. Of the 26 enrollees, ten predicted they would get As, seven predicted Bs, nine predicted Cs. Of the 23 who completed, eight received As, six received Bs, four received Cs, three Ds, and two Fs. Most students believed they would do well, and they did.

### Site Support—Class Management Strategies

Several methods were used to aid Site Coordinators in the management of class sessions and overall site support. Handouts and diagrams were mailed in advance in a sequenced binder. Homework, labs and tests were faxed in and returned by mail. Technical assistance in troubleshooting remote site equipment was provided on several occasions, as well as hand delivery of lab kits, supplies and videotapes of sessions missed due to off-days, e.g. spring breaks. In short, anything that would facilitate the consistent participation of the sites was considered essential to the success of the students.

## Evaluation Strategies

### Stakeholder Evaluation Design

An evaluation plan was designed by a stakeholder committee and was conducted at several levels, from the individual student achievement, course and faculty evaluations, the technical performance of the delivery system, to the site's student support system performance. Four major stakeholder groups participated in the course evaluation: students, instructor, the high school site coordinators and the instructional designer. Both formative and summative evaluation plans were part of the project. The formative evaluation of the course was conducted by the students and site coordinators during each session or to be turned in with their homework assignments.

### Evaluation Instruments

The evaluation instruments used included one-minute comment sheets on which the students recorded likes and dislikes within the session, a comments sheet for homework difficulty and questions, end-of-course evaluation sheets for all stakeholders, videotape reviews, assignment and lab grade reviews within the course, observation notes on class activity and interaction, technical discrepancy logs, phone logs, time logs, and final grade sheets. Most of the log materials were placed in one booklet for each high school site coordinator, instructor and designer. The one-minute comment sheets were provided to students during each class, and participation was emphasized. This evaluation plan provided perceptions from each viewpoint, and allowed a session-by-session report of success or failure.

The table below outlined their duties:

| Time | Students | Instructor | High School Coord. | Inst. Designer |
|---|---|---|---|---|
| **Before each session** | attach comments sheet to assignments | time log of prep needed for session | note problems in notebook, discrep. logs | time log of prep and set-up |
| **During each session** | one-minute comment sheet | observation log of class assignment grades | observation notes of class and participation | observation notes of class and interaction |
| **After each session** | keep phone log of calls to instructor | make observation notes of class, phone log of calls to and from students | technical discrep. log, videotape review if necessary, time log of prep & set-up | technical discrep. log, videotape review if necessary, time log of prep/set-up |
| **End of course** | EOC course evaluation sheet | EOC instructor evaluation sheet<br>final grade reports | EOC evaluation sheets (similar to students) | EOC evaluation report |

## Planned Changes for Future Courses

### Changing the "Irresistible Force"

**More academic long range planning for dual credit advanced placement courses.** Discussions with area high school administration indicate a strong interest in the availability of college-level technology courses. What is needed is a clearly defined program track that leads to a definite career path. Ivy Tech's Distance Education Office is working with its program chairs to develop such long-range curriculum courses for delivery via two-way technology.

**More interactive design.** While spontaneous interaction is never discouraged, it is seldom predictable and never guaranteed. Although this may vary from one course to another, time and other constraints dictate the necessity of planning interaction up-front at the design stage. The design must include learner-to-learner (peer), as well as learner-to-instructor interaction. Learners need time to share their problems and successes with other students without the instructor's oversight or even presence. Where appropriate, it is also desirable to include learner-to-material interaction, such as the labs.

### Planned Changes in the "Immovable Object"

**Very long-term scheduling with schools.** As programs become more structured, early collaboration between the college and the high schools should foster more compatible calendars and schedules. Two to three year advance scheduling is the goal of the project.

**Commitment to Site Coordinator support.** Site Coordinators play a most essential role, often without extra pay at the high school level. It is important to assure them of appreciation and value by providing easy to use guidelines, procedures and other tools to aid in classroom management and logistics.

## Conclusion

This course once again confirms that instructors need additional skills when using distance education, and that the instructional techniques used with interactive video are different from the traditional classroom (Carl 1986; Carl Chute, Balthaza, Poston 1988; McCleary and Egan 1989) and even different from those used in one-way video. While it was thought that the two-way technology naturally allowed interaction, the expectation of interaction does not occur without planning (Wagner 1994). Designed interaction and student involvement strategies (Smith 1991, Hillman et al 1994) and student-to-student group projects would have raised the level of course satisfaction, while a highly organized structure communicated clearly to students, advance organizers and structured notes would have aided the level of course success. This need for pre-planning, student study guides and structure was further confirmed in the literature by three years of data Sachs (1993) reported on compressed video for instruction.

While this course dealt with a technical, procedural, hands-on subject, any didactic material demands highly organized structure, learner interaction and planned motivation to be successfully delivered via two-way video. Further, any course delivered between separate institutions demands a full collaborative effort. Without both careful design and collaboration, any distance course—even on an interactive two-way video system—will not provide the learning success and satisfaction sought. The success of this collaboration between college and high schools has fostered a demand for further course scheduling in the coming year, a demand that Ivy Tech State College is committed to satisfy.

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# Web Resources and the Super Five: Critical Evaluation of Information and Tools

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## Abstract

It is impossible to read any type of publication or attend a conference without running into a discussion of the Internet. Educators are often frustrated by access and learning to tap resources. Because presentation of materials via the Web is so visually appealing, users may overlook the need to evaluate web content as they would more traditional information sources. This session presents the need to evaluate Web Sources, sites, and pages as well as review the "super five" approach to evaluating materials: currency, scope, objectivity, authority, and accuracy.

Because the resources presented via the World Wide Web and its search tools are easy to use and visually appealing, learners may forget to apply critical thinking and evaluative criteria to them. It is important to remember that traditional print resources are also still valid and that traditional means of evaluating information need to be applied to the Web resources as well.

## Session Objectives

- To present need for evaluating Web sources and its presentation of information
- To review the "super five" evaluation criteria
- To apply the "super five" evaluation criteria to web resources, sites, and tools

Excellent evaluation information for web sites can be located at the following addresses:

Widener University/Wolfgram Memorial Library
http://www.science.widener.edu/~withers/webeval.htm

Grassian, E. Thinking critically about World Wide Web resources
http://www.library.ucla.edu/libraries/college/instruct/critical.htm

Janicke, L. Resource selection and information evaluation
http://alexia.lis.uiuc.edu/~janicke/Evaluate.html

Libraries of Purdue University. Anyone can (and probably will) put anything up on the Internet
http://thorplus.lib.purdue.edu/~techman/eval.html

Libraries of Purdue University. Evaluating World Wide Web Information
http://thorplus.lib.purdue.edu/library_info/instruction/gs175/3gs175/evaluation.html

Kathy Schrock's Guide for Educators: Critical Evaluations Surveys
http://www.capecod.net/schrockguide/eval.htm

University at Albany Libraries. Evaluating Internet Resources
http://www.albany.edu/library/internet/evaluate.html

Ormondroyd, J., Engle, M., & Cosgrave, T. How to critically analyze information sources
http://www.library.cornell.edu/okuref/research/skill26.htm

## Autobiographical Sketch

**Dr. Bruwelheide** has taught several courses, workshops, and units about the Internet to a variety of adult learners. She is project director for two Internet training grants. Janis is the author of *The Copyright Primer* copublished by the American Library Association and the National Education. She is recognized nationally as an expert in intellectual property matters for educators, a distance learning expert, and telecourse designer/teacher.

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# Delivery of a Dietetics Degree Program by Distance Education

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## Introduction

Kansas State University (KSU), the state's land-grant institution in Manhattan, Kansas, is located approximately 130 miles west of Kansas City, 60 miles west of Topeka, and 130 miles northeast of Wichita. KSU dietetics students have, since the inception of the program in 1970, traveled considerable distances for their hands-on hospital-based training. Manhattan's two small community hospitals lacked sufficient patient size and diversity for the number of students, and thus during the last semester of their program, students relocated to these larger cities. Since the coordinated program in dietetics coordinates lecture material to accompany the practicum experience, students either commuted back to campus for classes or faculty drove to practicum sites for student interaction. This situation had long been a cause for concern due to costs, time involved, and safety issues.

## Finding and Funding a Solution

In September, 1994, faculty in the Department of Hotel, Restaurant, Institution Management and Dietetics met with grant-writing resource personnel on the KSU campus. At that meeting, the use of desktop videoconferencing (DTVC) was introduced as a possible solution to the dietetics dilemma. A suggestion was made to submit a proposal to the Fund for the Improvement of Post-Secondary Education (FIPSE) of the U.S. Department of Education. Faculty had two weeks to design a project which might capture the attention of the funding agency and to prepare a five page proposal.

The essence of the proposal centered on the need for registered dietitians in Kansas. Of the 105 counties in the state, 40 counties, primarily in the west, had no registered dietitians in residence. Since health care organizations must have the services of a registered dietitian if they are to receive Medicare and Medicaid funding, this shortage has serious consequences. Plans were proposed for local community colleges to provide the required prerequisite courses in the first two years of the dietetics program. Students would then apply to the professional phase (last two years of the program) which would be offered from the KSU campus by a variety of distance education methods. The required supervised practice or internship experiences also would be developed at sites across the state, thus enabling students to remain in their communities for their education and training. The distance education system would also be used to provide on-going continuing education opportunities for registered dietitians in all parts of the state.

In January, 1995, faculty received notification that their proposal survived the first round of cuts which reduced the 2100 proposal applications to a few hundred. A 25-page proposal was then produced and forwarded to FIPSE about six weeks later. In August, 1995, the dietetics program proposal was finally funded in the amount of $200,000 with matching funds from KSU.

In the fall of 1995, as a result of the recognition surrounding the awarding of the grant, the Provost's office designated the dietetics program as the "pilot program" for the university in distance education. This distinction meant additional university support to deliver the program through at least two complete cycles, at which time costs will be re-evaluated. Sixteen courses are to be redesigned to be delivered in a distance format and for each course a SWAT Team (Strategic Way to Apply Technology) has been formed. A SWAT Team is comprised of individuals with expertise from representative units across campus such as computer services, the Division of Continuing Education, the Registrar's Office, the College of Education, etc., who assist in the development of the course and work to resolve problems encountered. SWAT Team meetings are held on a regular basis to assist the faculty member whose course is being redesigned in resolving any problems which arise.

As this project has evolved over the past 12–18 months, the dietetics faculty are moving from DTVC to WWW/Internet-based course development, thus opening the door to asynchronous learning—anyplace, anywhere, anytime. This move came about partly due to the heavy traffic on the state videoconferencing system. Although approximately 40 sites are available across the state, the ever-increasing usage by numerous groups and individuals have reduced the amount of time available for instruction. DTVC will continue to be used as an adjunct to the Internet-based courses, but is no longer our primary delivery mechanism. Courses are now being designed to be taught on the Internet, with use of videoconferencing, e-mail, message boards, listservs, chat rooms and conference calls as ancillary means of faculty/student interaction.

## Issues Faced and Lessons Learned

### Student Readiness

One of the first major challenges we have had to face is the issue of student readiness. Many students do not have the technological literacy needed to fully participate in this program. Campus computer lab access is a problem as more and more faculty utilize WWW assignments and other computer applications in their classes. While some students come to college with their own computer systems, most rely on the public computer labs of the university. Therefore, assisting students to prepare for involvement in Internet-based courses and videoconferencing is a continuing challenge. Faculty in the dietetics program use computer assignments in a variety of classes to continually expose students to the technology. Senior students recently hosted a seminar entitled "Cyberspace 2000" which introduced underclassmen to the technology and talked about the use of DTVC and Internet-based courses in their future classwork. All informational materials about the dietetics program now indicate the necessity for students to have their own computer systems as soon as possible, with ready access to a suitable computer system with modem mandatory by the senior year. Minimum computer specifications are outlined to aid students and their parents in purchasing decisions.

### Programmatic Issues

Hundreds of requests for information about the dietetics degree program have been received from all over the United States and from many foreign countries. A database has been created to track individuals who request information. Transcript evaluation and assessment of previous dietetic-related work experience of individuals has been an unanticipated addition to faculty and staff work load.

The Dean's Office in the College of Human Ecology has developed a matrix of prerequisite courses available at all community colleges in Kansas and their KSU equivalents. This information is now available on Kansas State University's home page on the World Wide Web, thus making it easy for interested students within Kansas to see which courses they need to take at a nearby community college and know which courses will transfer into the dietetics program. Of course, this does NOT meet the needs of students from outside the state or country who are interested in the dietetics. Working with out-of-state and international students is even more challenging and time consuming. A brochure describing the program is available on the Internet at http://www.dce.ksu.edu/dce/as/dietetics.html. The dietetics program director has visited with individuals from Ireland, Canada, South Africa, New Zealand, Greece, Korea, Taiwan, Japan and other countries who have accessed this web site for information.

### Procedural Issues

Students in the distance education program in dietetics enroll for classes through KSU's Division of Continuing Education (DCE), a separate division from regular on-campus offerings. We soon learned that because students were not on the regular university enrollment list, they disappeared from advising printouts and financial aid checks were not ready when needed. Since students were not physically on campus, their campus activity fees were waived, meaning they could not buy tickets to athletic events, use the library, or access student health services. Because DCE handles grade submissions on a different schedule, there was the possibility that grades might not be recorded on students' transcripts in time to meet deadlines for graduation or registration examination eligibility checks.

Due to the incredible support for this distance education venture by higher administration, these problems have been addressed and resolved quickly, or at least the dietetics students have been treated as "special cases" until procedural details could be resolved. Without the commitment of administration to this project, these issues could have mired the entire program in a flood of bureaucratic red tape. It is the goal of the university that while a student is participating in the dietetics program, there should be no problems for them in relation to their university experience whether taking courses on campus or off, in a traditional setting or by distance education.

### Curriculum Issues

Numerous challenges must be faced in making the conversion to distance education as quickly as possible. Dietetics at KSU is housed in the Department of Hotel, Restaurant, Institution Management and Dietetics (HRIMD), while Foods and Nutrition (FN) is a separate department. Over half of the professional courses are taught in FN. Working across departmental lines to redesign courses is more of a challenge than if all courses were taught in the same department. The FIPSE grant provides release time to pay for course redesign but even with this enticement, course redevelopment is slow.

The incorporation of already-developed distance education courses is being considered as a way to make the curriculum available sooner. Courses currently available on the WWW may be utilized.

Development of the supervised practice or internship component of the program is also a challenge. Providing quality hands-on experiences in rural settings is possible, but requires more imagination, innovation, and the cooperation of many players, some of whom have never been involved in working with a program in higher education. Orientation and training of new preceptors is a time-consuming, but critical process. However, this aspect of the program is vital to meeting the goal of training dietetics practitioners in their home regions which will hopefully entice them to stay there and provide much needed food and nutrition services.

### Administration Issues

Without the support of higher administration for a distance education venture, the road will be very rocky, if not impossible. The timing for the dietetics project was perfect since the proposal was funded at the same time as the KSU administration was recognizing that the university needed to move quickly toward technology-based course delivery. Re-engineering the dietetics program has become a model on the KSU campus. While the situation is exciting, the spotlight can be unnerving. The expectations of the administration are very high. However, along with this pressure has come an incredible cadre of experts and resources which have been placed at the disposal of the dietetics faculty to make this venture successful.

### Faculty Issues

Faculty are under great pressure to meet many different demands. The thought of completely re-engineering a course to be taught in a new way may seem overwhelming. Change is never easy and when the change involves learning a new technology, this can seem even more daunting. Some faculty have a severe case of "techno-phobia." These faculty must be brought along and be exposed to the fun and exciting side of distance education technology. It is important for faculty to understand that help is available, that they don't have to do all the work themselves, and that they don't have to understand HOW the technology works in order to be able to use it.

### Student Issues

While it may be assumed that college students are comfortable with technology, we have found this is not the case. Entering freshmen at KSU are now assigned a computer user ID upon admission and every effort is made to get them "on-line" as soon as possible. Faculty require students to communicate with them via e-mail and listservs or to submit assignments via computer file transfer. Dietetics faculty constantly refer students to KSU's home page for information and to make assignments which require Internet access or participation in on-line chat rooms. Students must also learn computer and videoconferencing etiquette.

## Summary

Re-engineering our courses and curriculum has revitalized both faculty and students. Students who are educated using this technology enter the workplace with a high level of comfort in utilizing such technology on the job. Likewise, students who work through

Internet-based courses independently will hopefully take this self-discipline and motivation into the workplace.

The potential of forging new relationships with other institutions is also very exciting. Whether using on-line courses developed by other universities or sharing faculty across the miles to meet program needs, joint ventures between institutions of higher learning are limited only by one's imagination. The potential to range far and wide for new and different internship experiences is also exciting. Outstanding practitioners from around the country or the world can be brought into the classroom via distance education technology. The dietetics faculty have shared special guest speakers with practitioners around the state, providing additional continuing education possibilities as well as revenue-generation for the university.

A quote now used frequently by our faculty is "when you are on the cutting edge, you bleed a little!" While we have experienced some "bloodshed" during our project, the rewards have far outweighed the headaches. We have created more questions than we have answered. By sharing some of these questions and challenges, we hope to help others have a smoother path to follow. While not everyone is technologically gifted or inclined, we are all going to be called on to embrace the high-tech future if we are to survive both personally and professionally. It is in the sharing of these ventures that we can help each other move more smoothly down the on-ramp to the Information Superhighway.

## Autobiographical Sketch

**Deborah D. Canter, Ph.D., RD, LD,** is Professor and Director of the Coordinated Program in Dietetics at Kansas State University in Manhattan, Kansas. Dr. Canter received her Ph.D. from the University of Tennessee, Knoxville, in food systems administration and a minor in educational psychology. She has been on the faculty at K-State since 1977. She directs a program which combines a baccalaureate degree with 1000 hours of hands-on experience in various aspects of dietetics practice including clinical dietetics, public health nutrition and food service systems management. Dr. Canter's area of expertise is in the area of food service management, consulting and entrepreneurship. She has served twice on the national Board of Directors of The American Dietetic Association and currently serves as editor of the *School Food Service Research Review,* the refereed research publication of The American School Food Service Association. In 1991, Dr. Canter was named Professor of the Year for Kansas by the Council for the Advancement and Support of Education (CASE), Washington, D.C.

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# Cultural Connections:
# A Model for K–12 Videoconferencing

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The purpose of Cultural Connections is to promote academic achievement, cross-cultural understanding, and self-esteem in school students. We have a track record of success with students in Waller ISD, Somerville ISD, and San Benito ISD where teachers and students have been collaborating across 400 mile distances to design and conduct curricular activities. Students collaborate with distant partners on activities across the curriculum. Students who have participated have shown dramatic improvements in academic achievement and self-esteem. We have yet to measure cross-cultural understanding but qualitative data indicates improvements there as well. We assess technical and human resources needed at participating schools in order to implement the model for distance learning through Cultural Connections. Following needs assessment we implement the following distance learning model:

- Establish a vision for connecting with distant others
- Connect with distant sites to share the vision
- Identify workshops needed to support envisioned activities; these may include:
  - Interactive videoconferencing
  - Desktop videoconferencing
  - Relationship building and collaboration over distances
  - Meeting the Texas Essential Knowledge and Skills (TEKS) through Cultural Connections
  - Instructional applications of interactive and desktop videoconferencing
  - Development of distance learning activities and multimedia development
- Conduct workshops as needed and just-on-time
- Develop or identify activities across the curriculum
- Connect teachers with distant partners who share interests
- Assist in student multimedia portfolio development
- Assist in initial meetings and follow-up activities
- Plan documentation and evaluation strategies

When asked, "What is the most important aspect of Cultural Connections?" Trina Davis immediately answers, "The powerful effects on my students." She tells stories about her student who won the struggle to leave gang membership and students who grew in their abilities to speak with confidence before a group. Ester Gonzales describes the pride that her students express over their newly acquired technical skills and we can witness that pride by reading the multimedia portfolio pieces designed by her students. As a result of participation in Cultural Connections, Berta Cabaza Middle School in San Benito leads the state of Texas in number of videoconferences. Ms Davis and Ms Gonzales team teach across 400 miles. When their students meet, their rooms become one classroom with two facilitators. All students know each other's names and consider both teachers to be theirs. Through Cultural Connections participating students are given the opportunity to learn about other's perspectives and are given opportunities to apply technical expertise to meaningful activity.

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# Student Attitudes About Computer Conferencing Used as a Supplemental Delivery System

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## Introduction

Multiple media are increasingly being used in the delivery of courses, especially those delivered at a distance. Computer conferencing is being used with correspondence courses to add a previously missing interactive component and the World Wide Web (WWW) is being used as an "umbrella technology" from which students can access online course documents, video and audio clips and interactive course components such as "chat" programs, mail distribution lists and computer conferencing. For a number of years, graduate courses have offered at a distance by the Department of Adult Education at The Pennsylvania State University using audioconferencing, which may be considered by some to be a "low level" technology. Five years ago the use of a newsgroup was added to some of these courses, but with little response from the students.

From 1993 through 1996 one of the authors served as a teaching assistant to a series of international courses leading to a certificate in the study of distance education (Moore, Candor, Cookson, Collins & Gayol 1994: 1995). Participating in the courses were student groups in two or three different sites in Pennsylvania , several sites in Finland and Mexico and one in Estonia. Courses were typically delivered via audioconferencing on seven Saturdays during a semester and were supported by a book of readings.

The first new technology added to the media mix was computer-conferencing, using LISTSERV, a mail distribution program. This was possible because all students were either professionals or students at universities with Internet access. This did not entirely prevent access problems, as some students had not activated their email accounts, others lived outside of the local calling area or did not own a computer and there were always students still struggling several weeks into each semester. The professor was always anxious to try new delivery technologies and over the three years audiographics equipment was installed, and videoconferencing attempted among the sites. The final technology added to the courses was a World Wide Web homepage in Fall, 1995.

Student projects involved each site group presenting an hour's worth of instruction to the rest of the class. One requirement was that at least two delivery technologies be used, and in the second of the courses reported here students were to use paper (study guide, articles, questionnaires etc.) and the computer conference and then one other recorded (videotape, audiotape, printed matter) and one other synchronous technology (audioconferencing, videoconferencing, audiographics).

While primarily interested in evaluating the students' reactions to and satisfaction with, the computer conferencing component of the courses (Collins & Berge, 1994; 1995), this research series also inquired about the other technologies used in the course. Another goal of the evaluations was to gather data to improve this and similar, future courses and to discover productive lines of future research. Data was collected over two semesters using a fifty-two item questionnaire given to approximately 92 students located at eight different sites (in different combinations depending upon the specific semester) in four different countries: the United States (three sites, all members of the same university system), Finland (at the Universities of Turku and Helsinki), Estonia (University of Tallin) and in Mexico (at the National Autonomous University of Mexico and the University of Guadalajara). Some students had taken prior audioconferencing courses, some had used email, and some students were brand new to both forms of communication. There are many studies comparing courses taught using different media, but few that look at the relative importance to students of different delivery media within the same course.

Topics for data collection included: experience with computers and email; access to the computer conference; training/getting help/feedback received to assignments or queries to the list; perceptions of this specific computer conference regarding such things as efficiency as a medium for turning in assignments, ease of use, effectiveness in learning, scheduling time, management of the course; technical aspects of the conference/access; interaction with the course content; interactions with others through/because of the list; and the student's demographic characteristics.

The students were also asked to rate the relative importance of various learning modalities used in the courses and that will be reported here. In Fall 1995, use of the World Wide Web was still very new and the home page was set up only after the site coordinators discovered that they all used a web-browser. They believed that the homepage might solve the perennial problem of distributing student project materials to the other sites in an inexpensive and timely manner. One student group decided, as their final project, to present a lesson to the other members of the course on how to build a webpage.

## Discussion

In one part of the evaluation, the students were asked to rate, on a scale of 1 to 5, the importance of each of the learning modalities in the courses. During the audioconferencing portion of the course the instructor explained the readings and shared anecdotal examples of distance education practice and the students reported on small group discussions over various topics and shared their experiences with each other. (Bunker, Gayol, Nti & Reidel, 1995). In the first of the two courses, one student group handed out evaluations at every class period as part of their final course project and the second course was the first in which web pages were used.

Constructivists stress the importance of students building their own knowledge and often use discussion and various interactive modalities to encourage such learning. So it was somewhat of a surprise that the students in the first course should rate the book of readings as the most important learning modality in the course (with very little range in their responses (*SD* = 0.65), considering all the interactive elements available, but comments from other students were a close second. This first course was also the first that many of the students had taken at a distance so the book of readings was probably the most familiar of the technologies.

**Table 1: Relative Importance to Students of Various Learning Modalities the Course**

| | Fall 1993 | | Fall 1995 | |
|---|---|---|---|---|
| | All | *SD* | All | *SD* |
| How important to you was: | | | | |
| 41 Book of readings | 4.50 | 0.65 | 4.08 | 0.97 |
| 46 Comments by other students | 4.46 | 0.57 | 4.37 | 0.68 |
| 45 In-class group assignments | 4.32 | 0.84 | 4.16 | 1.12 |
| 47 Comments by instructors | 4.16 | 0.89 | 4.25 | 0.88 |
| 40 Audioconferencing | 4.08 | 0.92 | 4.08 | 0.97 |
| 42 DECERT-L discussion list | 4.02 | 0.97 | 3.96 | 0.96 |
| 44 Frequent course evaluations | 3.74 | 1.16 | | |
| 43 Video presentations | 3.30 | 1.29 | | |
| Interacting with foreign students | | | 4.42 | 0.88 |
| Web Pages | | | 3.92 | 1.32 |

*Note:* Rated on a Likert scale of (1) not important at all to (5) very important.

This had changed somewhat by the time this cohort took the third course in the series (the second reported here) where they rated interaction with foreign students as the most important aspect. The students in Mexico, Finland and Estonia were all professionals already working in the field and they freely shared their experiences, where the students in Pennsylvania were graduate students preparing for a career in distance education.

That comments by the instructor should rate 4th in the first class and 3rd in the second is also of note as these students appear to believe it more important that they should talk to each other, than listen to an instructor. The inclass group assignments also ranked highly in both classes, perhaps, again, because the students had an opportunity to talk with and listen to each other.

The computer conferencing portion of the course consistently ranked lower than the other technologies, although it was integrated into the course and used to report on and discuss homework assignments. A number of the students consistently had access problems, and, during the 2nd course reported here, on university had a server down for most of the semester, preventing students from receiving email.

During the 2nd course reported here the web pages were mostly used by the site coordinators to put up materials for student projects, to be downloaded at the other sites. This proved to be very convenient and a saving in both time and mailing costs. The materials still had to be downloaded by the site coordinator and copied at the receiving site, but at least they were always available prior to a particular team's presentation, and the students were able to plan for a shorter lead time, and take longer on the preparation of their materials. The course syllabus was put on the web page at the beginning of the course and each meeting's agenda was distributed via the computer conference and posted to the web page several days ahead. This saved long distance phone costs in faxing the agendas to each site. Also archived on the web pages were the instructor's lecture notes and the notebooks of each month's discussion in the computer conference.

## Conclusion

Further exploration of the relative worth to students of various delivery technologies within courses will aid faculty in making wise choices among the many delivery technologies available. In distributed learning situations where students may be at widely scattered receive sites, but without computer access themselves, the distribution of materials via web pages so they can be downloaded, copied and distributed by a local coordinator may distribute the effort of ensuring materials are available to students in a timely manner.

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# Reducing Conversational Chaos: The Use of Communications Conventions in Instructional Electronic Chats

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## Abstract

The authors observed and participated in scheduled "chat" sessions that took place as part of three courses delivered primarily by two way audio/two way compressed video conferencing. The students involved developed communication conventions to reduce the conversational chaos that can develop when groups of students communicate synchronously. The students recognized a need to develop and use communication conventions and protocols to communicate clearly and minimize misunderstandings in their online transactions with others. The more obvious conventions included using keywords and names of individuals, shorthand techniques, non-verbal cues in text, and asking questions and seeking clarification.

The authors also offer suggestions for the optimal use of "chat" in virtual classrooms.

## Introduction

In an effort to bring the spontaneity of synchronous communication into electronic classrooms, instructors are turning to synchronous chat programs such as IRC (an international, public Internet facility known as Internet Relay Chat), the "chat" feature built into computer conference programs like FirstClass™, and web-based chat programs integrated into web-browsers like Netscape.

## Using "Chat" in Instruction

Chat programs are intriguing to educators as they appear to allow a sense of communicative immediacy and presence that is often lacking in asynchronous computer-mediated communication. Synchronous dialog, if it could be appropriately structured, could go a long way to reducing the sense of distance and isolation often experienced by students studying in virtual classrooms. Questions and concerns could be quickly raised and addressed and misunderstandings sorted out. The use of chat programs, however, poses challenges for educators, because the verbal and non-verbal communication protocols used in face-to-face or in video-based distance education settings may not be sufficient for quality educational exchange with and among participants via chats.

The design of most forms of IRC software is such that multiple, disjointed conversational threads can develop quickly as various members of the group form smaller conversational groups, each focused on their own topic and who ignore or only intermittently join in others. This may result in conversational chaos. Day and Batson (1995) note "although at first it may seem difficult to follow the separate strands or topics, classes typically get used to the nonlinear 'flow' of the conversation rather quickly" (p. 29). They do not say how this "getting used to" occurs, nor how students develop and establish the communication conventions necessary for meaning-making in the turbulent flow of on-screen conversation. This is the problem that has intrigued us.

Over the course of three semesters, the authors participated in and logged chat sessions that took place among the authors and students in five educational technology and distance education courses in the College of Education at Texas A&M University. These courses were delivered via two-way audio/two way compressed video, with computer conferencing used as both an adjunct and a replacement for some scheduled class meetings.

From our observations and student reflections, we would like to offer the following suggestions to instructors who wish to use synchronous communication in their courses.

### Advantages of Chats in Instruction

Synchronous chat fosters immediacy and a sense of social presence—someone is really "out there" on the other side of the computer screen. This realization can set the stage for the development of a sense of community among learners. Chat is useful for brainstorming and decision-making and the discussion of timely issues. Between student and teacher, chats can be used for one-on-one advising at a distance, without incurring long distance phone charges and can be a useful supplement to other forms of communication.

Synchronous chats are best used with small groups of 2 to 5 persons when there is no discussion moderator or a task structure to the group. It works well for students who are working collaboratively in task groups: those who know each other from other settings and know each other's communication styles.

### Limitations of Chats in Instruction

Chat does not work well for the delivery of didactic lectures of more than three sentences or so. Chats require that all participants are present online at the same time so can be difficult for people who are dispersed over time zones or on different time/work schedules. Large groups (over 5) tend to splinter into smaller conversational groups so multiple threads can develop quickly. If entries are not keyworded to indicate the different threads, the discussion quickly becomes very confusing. Students with poor typing skills find it very difficult to make comments in a timely fashion, and students who are not native speakers of English can quickly become lost in the stream of words. Students inexperienced with electronic communication seem to be at a disadvantage, as are students who cannot manage "conversational chaos" as the text goes scrolling up the screen. In situations without communication protocols or task structure established ahead of time, conversation can become a free-for-all that is not conducive to learning.

### Moderating Chats

Chats can be moderated by a student, a team of students or the instructor, either by design or default, i.e., someone can be assigned the task, or not be challenged when they assume it. The moderator can lead the discussion, or that task can be assigned or assumed by others, depending on the instructional goals. The decisions about how much moderating should occur can be made by the instructor, or can become a matter of collaborative decision making. All inputs look the same on the screen; the only indicator is the poster's nickname that identifies each entry. Each entry appears to have equal weight, so it is sometimes difficult to distinguish the moderator "voice" from that of other participants.

The instructor needs to make some decisions about how much training in communications conventions should occur before the students embark on their "chat" experiences. If students discuss the topic in class or are assigned to read a paper on the topic, the instructor can make the students aware of the need for such conventions and the possibilities available. Training can be explicit, or the instructor or a more experienced student can model the use of conventions and hope that the students will "pick up" the useful ones. On the other hand, the instructor or moderator can trust to luck, and hope the students quickly develop their own ways of making group and individual meaning possible.

### Followup of Chats

If the log or transcript of chats is posted to an asynchronous computer conference, put into a netnews group, or sent to the participants via email, it can become part of the class materials for further examination and discussion. If students are asked to reflect on chats they can develop some insight into what transpired, and often discover content that was missed in the flow of conversation. This is particularly valuable for those who cannot follow multiple threads in their heads, or who are not native English-speakers and for whom the discussion proceeded too quickly. Transcripts are a complete record of all that occurred during the chats and provide an accurate database for later content or discourse analysis.

## Useful Communications Conventions

The students in this study (Murphy & Collins, 1997a; 1997b) ) implemented conventions and protocols that were useful to them as they struggled to make meaning out of this new form of communication. We will illustrate these communication conventions and protocols with one- to two-line entries extracted from chat transcripts, identified by the individual who posted the input. The content analysis of the transcript indicates that the participants used the following conventions, in order of approximate frequency in the transcript. They are included below, beginning with the most commonly used conventions and ending with those least commonly used.

1. **Building (shared) meaning:** The students shared facts, helpful hints or techniques to indicate a shared meaning or an interest in the discussion topic:
   - ❖ When you weave you validate the contributions others have made which motivates further contributions (S1)
   - ❖ UNM brought up a number of tech problems . . . which for some of us might need defining, searches for solutions, consulting each other, etc. (S5)

2. **Keywords:** Many students adopted the convention of typing a keyword or personal name descriptor at the beginning of a line to indicate the subject of the entry:
   - ❖ UNM: whatever topic we decide, we need to weave it and keep responses (S4)
   - ❖ Student 10, re terms . . . Platforms, different conferencing software (FC and e-mail such as Pine and Elm) . . . there are many others. (S5)

3. **Shorthand/abbreviations:** The students used shorthand as a substitute for common phrases:

   - ❖ Student 4 UNM is behind TAMU, their capabilities are limited (S8)
   - ❖ Q&A OK Who weaves? All cannot weave at once. (S1)
   - ❖ TeleC—Dr. M can we talk to UNM over FC? (S6)

4. **Social presence creators:** The students created a sense of social presence, by referring to each other by name, and by sharing activities, both on- and off-line:

   - ❖ Student 2 I was there a while ago. Did your life pass before your eyes and a bright light show up a long way away? (S6)
   - ❖ I feel like we need more interaction with them to make it a truly worthwhile learning experience, not just superficial communication (S4)

5. **Playfulness and humor:** The students exhibited their playfulness and humor in attempts to have fun with each other in socially acceptable ways:

   - ❖ TeleC—Weaving—Quiet Student 1 might do a bang up job. (S6)
   - ❖ Shhhhh (S1)

6. **Non-verbal cues in text:** The participants adopted the use of conventional text emphasis cues (e.g., underlining, punctuation marks, and capital letters that often indicate SHOUTING) to express non-verbal communication:

   - ❖ Man I got lost! (S2)
   - ❖ "Cognitive learning strategies" in my mind refer to learning to learn strategies/ methods of learning . . . therefore, such terms as scaffolding, linking, working with zones of proximal development (S5)

7. **Questions:** Students felt comfortable enough to pose questions and seek clarification of meaning, often from each other:

   - ❖ Student 6 do you mind sending me something related to what you will do? It will be a nice way for me to learn (S10)
   - ❖ What are you talking about (S10)

8. **Status indicators:** Evidence of assumption of high status is seen in these postings in which students sought to direct the group activities:

   - ❖ Hey, let's not drift apart in our conversations . . . (S7)
   - ❖ TeleC—who will start—Should we not begin with an invitation for questions? We could put forward and initial question, but open the conversation for others at the same time. (S6)

9. **Continuation of contributions indicated by ellipses:** The participants used ellipses (. . .) to indicate continuation of a thought from one input line to another:

   - ❖ Telecomp: Nobody knows how to use it yet, most likely, except for a few of you. I posted instructions at the top of the board. People would need to be advised to read them first . . . (I)

- . . . but you'd need to set the example of posting and replying, to demonstrate the threading capabilities. (I)

10. **Emoticons (smilies):** The participants occasionally expressed emotions by using emoticons such as smilies:

    - Student 1, Student 6, do you mean there are NO quiet students in this class ;-) (I)

There were no inputs that could be interpreted as flaming in any of the transcripts. In all, the students developed a repertoire of communication conventions and protocols that they used in this and subsequent IEC.

### The Need for Using Communication Conventions and Protocols

The following remarks, which are extracted from the transcript of an asynchronous conference in one course, reflect the students' recognition of a need to use a variety of these conventions and protocols to make sense and meaning of their experience.

The students discussed clarity of communication through using keyword descriptors. One student suggested this chat protocol: "Start every line with a referent: if there are two topics underway, use a title to refer to which topic you are chatting about" (S4, 2-10-97). A second student replied to this posting with the following: "The FC protocol was helpful. I tend to get excited about replying and forget to type in the person I am responding to. Thanks I will try to remember this on the next FC Chat" (S3, 2-11-97). Yet another remarked, "the first chat was not well organized but the second one was improved because of the method of mentioning the name of the students who supposed to answer or respond to a particular statement" (S8, 2-22-97).

Students used metaphors to create shared meanings with their classmates, even explaining new words to reduce possible misunderstandings. "Looking back at the chat, my comments seem like you may have created a monster. The proverbial vaccination with the victrola needle. Student 10, are you familiar with the term Victrola? It is a brand of record player. Being vaccinated with a Victrola needle means a person talks a lot" (S6, 2-20-97). Another student's metaphor related to literature: "To me the synchronous chats are much like Faulkner's use of stream of consciousness in some of his works. It is analogous to the way one thinks . . . a flow of information and thoughts. Sometimes mine become waterfalls, but most of the time they move at a slow trickle! Like finding water during a Texas drought" (S5, 2-24-97).

Students, particularly those from other countries, recognized the challenges of the constant and rapid flow of text up their screen during chats. For example, one international student remarked, "Well, chat is never my friend. I cannot keep on with the speed of information coming in. Instead of pitching in at wrong time, I prefer to read and contribute when necessary" (S8, 2-22-97). Another student, without the additional burden of English as a second language, still faced problems with his slow typing speed. He commented, "I had developed some strategies to get around my slow typing speed. I also had an idea of how the process worked so I could tolerate more 'noise' on the chat" (S6, 2-20-97).

Another technique that students recognized as important in building online relationships was self-disclosure, perhaps from their desire to create a sense of personal presence or to present themselves on an equal footing to those without excellent telecommunication skills, as the following excerpt suggests.

> I would be very interested in learning if others find live chats similar to what I found or if they find them particularly enjoyable . . . I do not like to read large amounts of text. I think therefore, that some of my unease in the first chat was due to personality and preference (S6, 2-20-97).

## Conclusions

Much research on the development and use of communication conventions in computer-mediated communication has been conducted on transcripts of asynchronous conferencing in instructional environments (Harasim, 1990; Henri, 1992; Hiltz, 1994). Research on communication conventions in synchronous computer-mediated communication has occurred in settings such as MOOs and IRCs, both of which are used primarily for social and recreational activities. Not surprisingly, in this synchronous format most of the research has concentrated on the social aspects of communication, such as play and role-taking (Kuehn, 1993; Ruedenberg et al., 1995). The literature on real-time, computer-based communication in instructional settings is sparse, concentrating primarily on MOOs in which scholarly collaboration occurs (Day, Crump, & Rickly, 1996; Fanderclai, 1995), college writing classes (Day & Batson, 1995) and literature classes (Harris, 1995), and forms of exploratory MUDs for primary and secondary students (Woodruff, 1995).

Our study indicates that the students recognized a need to use their communication conventions and protocols to communicate clearly and minimize misunderstandings in their online transactions. The courses required the students to work collaboratively in small and large group endeavors throughout the semester. The chats in FirstClass provided regular opportunities for the students to ask questions, establish work schedules, make decisions, and stay in touch with their classmates and with the instructor. The students' metacognitive comments in the asynchronous conferences reflected their confusion when trying to follow multiple chains of discussion at once. It was particularly for the slow typists and non-native speakers of English. At the same time, these metacognitive comments reflect the students' growing skill in using keywords and names of individuals, shorthand techniques, asking questions and seeking clarification, and non-verbal cues in text.

Students were provided with little training or direction in the use of communication conventions and protocols prior to using chats in FirstClass, so the protocols that they developed were based on their prior experience in similar communicative settings (email, classrooms, and face-to-face communication). Consistent with findings of other research (Rohfeld & Hiemstra, 1995), the students acknowledged that the IECs would have been less productive and more difficult without having first established rapport with the other group members in a face-to-face setting.

Additionally, as Hillman, Willis, & Gunawardena (1994) suggest, it is imperative to determine how best to help students in advance to be competent with the technology, in this case the chat process, as they typically don't have the experience of working in a synchronous computer communication setting. Pairing students with keyboard partners of unequal ability in the FirstClass training session appeared to decrease the cognitive load created by having to pay simultaneous attention to content and a new technological process.

What structures, like shared keyboards and group work, lead to the social construction of knowledge via IECs?

When asked to debrief their chat sessions online, students in an earlier course made such observations as "you can interrupt without interrupting," "I feel I'm in another world," "you can't send too much content in a chat," "a moderator is needed in a chat involving more than 2 people," "good for visual learners and field dependent learners," and "Hey, can we get back on video and hash this out? I find chats very frustrating" (excerpted from a large group chat using FirstClass, 7-24-96).

## Further Research

Further investigation could determine optimal pedagogical techniques to be employed effectively in IECs of different kinds. Because of the growing global community fostered in the computer-mediated communication environment, it would also seem important to determine ways to empower non-native speakers of English with the conventions and protocols necessary to communicate easily in IECs.

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## Autobiographical Sketches

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# Save Yourself From Drowning in Online Interaction

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## Introduction

"My email is killing me! Do you know how often students send me email?"

"I can easily get 100 emails a day. Not only do they send me their original question but then they send me emails to confirm that I've received their original email!"

"And it's not just email. They want me to mediate their online discussions."

"Does anyone realize how much effort these online courses take???"

Such is a compilation of comments I hear from the faculty I assist in my role as an instructional designer of distance learning courses. This had led me on the quest to find alternatives which can alleviate the agony and the ecstasy of the new opportunities for interaction which are now available online.

As we all know, distance education in one form or another has existed for decades, but the level of interaction possible with distance education delivery modes such as print or one-way audio or video, has been limited in the past. Learners traditionally interacted on a restricted basis with the instructor and were generally precluded from becoming acquainted with or interacting with each other while studying from a distance.

The newest delivery mode of distance education utilizes the Internet and provides increased interaction opportunities through multimedia learning environments in which a learner can utilize on-line conferencing, electronic mail, bulletin board, and "chat room" facilities to interact and collaborate with the instructor as well as other learners.

As an instructor considers transforming face-to-face courses to online courses, one of the most daunting aspects he or she faces is the amount of interaction in an online environment. With the increase in student numbers inherent in a distance course, how can the exponential increase in student-instructor interaction be managed? How can email be managed? How can feedback be provided in a timely and effective manner? How should collaboration be utilized?

The purpose of this paper is to throw faculty a lifeline by providing practical suggestions which can be used to implement and manage interactivity in an online environment. Student-to-teacher and student-to-student interaction techniques will be discussed.

## The New Paradigm

Pedagogy traditionally incorporated one or more of three modes of interaction: between instructor and student, between student and instructional resources, and between students themselves.

Teaching strategies which include all three forms of interaction have not been the norm in the reality of higher education. In a traditional college classroom, it has not always been possible to structure or manage individualized learning experiences; nor has it always been possible to employ collaborative strategies in the limited time of a synchronous class session. The pedagogical model of the instructor as a predominant source of information has hindered the incorporation of interaction beyond that which occurs between the instructor and the student.

The opportunities for interaction in an online environment are greater simply because the time limitation does *not* exist and technology *does* exist which can facilitate all three forms of dialogue.

From an instructor's point of view, Moore (1995) summed up the new pedagogical model nicely in the phrase "Participation versus Presentation." He states that "interactive teaching is really a 'mental set' that requires us to think about inducing knowledge rather than instilling it, to asking questions rather than giving answers, to focusing on student participation rather than the teacher's presentation of information" (p. 133). Today's ideal learning environment engages the learner and recognizes the learner as a having the potential to be the master of his or her own destiny. Under this model the instructor becomes mentor to the student, who serves as content consultant, motivator and contextual integrator, as well as a participatory manager of the learning experience.

## Management of Online Interaction

### Lifesaver #1: Throw Yourself a Lifeline by Harnessing the Technology

**Email.** Before email drives you below the surface for the third time, consider organizing it in the following manner:

- Establish a course account to separate class mail from your regular email.
- Use filters to sort email notes or file them according to topic and class.
- Be honest with students about the volume of mail you receive and provide a window of expected response time.
- Establish online office hours.
- Require students use precise subject lines for their notes. This way content questions can be separated from administrative issues and be forwarded to the appropriate individuals.
- Ask for Yes/No responses.

**Course webpage.** Organize the course webpage to include a:

- Technical assistance area for questions from students who are having problems using the technology. Provide "additional points" for students who will serve as technical gurus for the week. Use as an assignment.

- Provide a bulletin board on which you can post the most frequently asked questions regarding assignments and grading so that students won't be compelled to send you email notes for clarification.

### Lifesaver #2: Do the "Feed Back-Float"

- Use your word processing software to set up a database of responses regarding test and assignments. Standardized responses can be crafted in a manner which leaves students with the perception that you have sent them a personal note.

### Lifesaver #3: Teach Your Students to Swim

One of the perception changes which is required as part of the instructional paradigm shift occurring is to increase student self-direction and confidence in peer abilities. This can be accomplished in a collaborative environment which includes elements such as:

- Set up student to student interaction through introductory activities.
- Assign students to groups and assign roles for discussions.
- Assess based upon group projects.
- Use peer- and self-grading, particularly for group projects.
- Require each student or group to be a tutor or "guru" for a particular concept area.
- Encourage online self-study groups.

## Conclusion

To maintain one's sanity as an instructor in today's online environment, don't let interaction be an albatross dragging you to the bottom of the pool. Capitalize upon the potential benefits of technology to streamline instructor to student interaction and create student synergy through collaborative activities and support systems to maximize student to student interaction. Take some of the steps mentioned above to keep your head above water!

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### Autobiographical Sketch

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# Wrap Your Key Points in a Story: Storytelling for Interactive Television

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Storytelling with a transition to a key teaching/training point is an excellent attention-focusing strategy. It is useful at all levels of teaching and training. However, storytelling can be enhanced and reinforced if it is visualized. The storytelling template suggested will be helpful for developing effective stories.

Everyone loves a good story. Stories captivate, involve, relate, entertain, instruct, inform, and most importantly, make and reinforce key teaching points. When an instructor says, "Let me tell you a story about something that happened to me a number of years ago that will demonstrate why these two learning performance objectives are so important," every eye of every student is focused on the instructor. The teacher who can wrap a teaching point in a story will motivate students to learn. A good story touches something within us that we can relate to and teaches something about ourselves and our world. It can provoke a tear, tease a smile, nudge a laugh, and cause us to reflect on who we are and where we have been. These personal introspections touch our deepest feelings.

The use of storytelling in the college classroom is something that instructors often hear about but seldom use in their own teaching. "War stories" are often employed that have nothing to do with the material taught. The ability to identify the three or four key teaching points that an instructor wants to make during a 50 minute teleclass is very important. The key points of a telelesson tell us what we want the student to know. The learning performance objectives tell the student what they are expected to do with the knowledge. It is this clarity of communication that distinguishes great teachers from good ones. The ability to wrap these learning performance objectives in a relevant story that the student can relate to based on their prior experience is an acquired and developed skill. The well-told story can cause joy, personal growth, understanding, connections with the past, linkages with other students who have shared the story, and wonderment about the future.

In addition to reinforcing key teaching points, stories are used to establish a rapport with a new group of students. Stories can also be used to create a mood, build to a climax, make the students reflect about some important point, or teach a moral. Interest in a subject can be aroused by a story; values, attitudes, and ideals can be expressed; and real life models can be presented.

All stories have some type of structure. Each has an introduction; a setting in which the story takes place; development of a plot in which a conflict or opportunity is related; a climax; and a conclusion in which resolution of the climax or opportunity is expressed.

### Storytelling Template

What is the key point or learning performance objective that you are trying to reinforce with the story?

**All stories have:**

- Title-make it catchy (even pithy) and short
- Opening-grab their attention and hold it
- Body-personalize with local names and places
- Conclusion-make a transition to the key teaching point around which the story was built

**Possibilities to open:**

- Important: Create a mood; setting; date and time; weather; other characters; grabber; understatement or over-statement.
- Open with a conclusion and use a flashback.
- Establish an immediate crisis.
- Did you know that . . .
- Read a statistic and then refute it.
- Use a trigger video, commercial or homemade.
- Two overhead projectors with contradictory statements.
- Two 35mm slides with contradictory visuals.
- Artifact—Do you know what this is? It saved my life.
- Theatrics—costume, hat, other.
- Controversial statement.
- Puppet.
- Visual analogy or dramatic reading.
- Magic trick.
- Cover something and create curiosity. "Do you know what is in this covered box?"

**Contextual shells:**

"Let me tell you a story about . . ."
"This is important because . . ."
"This really happened to me . . ."
"Do you realize that . . ."
"By golly, I remember when . . ."
"It was a nasty day in November 1963 . . ."
"Billy Moore was a teacher with a lot of character. Do you know what character is?"
"Paul Middy died last week. He was my freshman English teacher. He had the greatest impact on me as a teacher because . . ."
"Look at this object. What is it? Let me tell you how it saved my life . . ."
"I am reminded of . . ."

**Body:**

- Dialogue between two characters.
- Conflict.
- Detail: Local names, places, color.
- Dramatize: Shout out; whisper; glare; use magic; effective non-verbal communication.
- Costumes, masks, theatrics.
- Character types.
- Development of the problem.

- Repetition: "It was the first hour of my first day of my first year of teaching . . ."
- Audience participation: "Take your wallets out and count how much money you have in it."
- Use of pictures or artifacts.
- Circumstances and events.
- Visualize your topic to dramatize it. Use puppets, artifacts, hats, or anything.

**Conclusion:**

- Transition to the teaching point.
- Resolution.
- Timing.
- End with a: Statement; question; analogy; humor; illusion; or a call to action.

### Storytelling Plot Prompts

*What* did you do; to *whom; where; when; why;* and with *what* results? *How* was it resolved or what was the outcome? *What* was learned? You are the greatest source of stories.

The purpose of these plot prompts is to help you to think of a story of something that happened to you as a teacher at any level (K–18+) or as a student at any level. Think in terms of: The consequences; humorous outcome; personal implication; lesson learned; or beneficial outcome.

Identify the most important point that you want the students to learn in a lesson and wrap it in a story.

- Do you remember when you went blank during a test? What did you do?
- Do you remember when a teacher embarrassed you in front of your classmates?
- Did you ever embarrass a teacher?
- Was there ever an occasion when a student taught you something about teaching?
- Was there ever a time that you forgot there was a test when you showed up in class? What did you and the teacher do?
- Was there ever a time when you received a lower grade than you felt you deserved? What did you do about it?
- Did you ever see anyone cheat and then get a higher test score than you did? What did/didn't you do about it?
- Was there ever an occasion that you had an appointment with a teacher and forgot it?
- Do you remember your first day of teaching? What were you thoughts and feelings?
- Did you ever teach without a lesson plan and just winged it? How did you feel?
- Do you remember as a student when you received your greatest compliment from a teacher?
- Do you remember the greatest compliment you ever gave a teacher? Why?
- Was there ever a time that you should have thanked a teacher but did not?
- Was there ever a movie or video that you saw as part of a class that really made you think? Why and what was the name of it?
- Did you ever go to class when you were really sick, but didn't want to miss it?
- Was there ever an in-school but out-of-class event that helped you?
- Please introduce the class to a teacher to whom you owe a great deal.
- Was there ever an extra curricular activity that had a great impact on you?

- Was there ever a teacher that you had in school that you wish your children or grandchildren could have?
- Did you ever have a "teacher from hell?"
- As a teacher, did you ever have a student tell you off?
- Did you ever lose your cool and tell a student off?
- Did you ever invite a student(s) to dinner at your home? Why?
- Did you ever have a student that you would like your children to be like?
- What was the biggest trouble that you ever got into at school?
- Did you ever have a really enthusiastic teacher that had a great influence on you?
- Was there ever a teacher that had a great influence on you either before or after class?
- Did you ever have a teacher who could always explain anything to you with clarity.
- Was there ever a teacher in your life after which you would like to name a child?
- Did you ever have a teacher who did really different things in class?
- Did you ever have a course that changed some of your values?
- Was there a teacher in your life that helped you to change a relationship with another person?
- Was there ever an occasion in your life in which you had to change schools one or more times? How did this make you feel?
- Who was the greatest teacher that you ever knew? What did s/he say/do that made you think so?

The use of stories in the teleclassroom will add interest, focus attention, and provide a mental hook for later recall. Write your stories out in full narrative form and review them for bias, gender and cultural sensitivity. If at first your story does not succeed, rework it and try again until you get the response that you wanted.

### Autobiographical Sketch

**Thomas E. Cyrs** is a professor of educational management and development and senior faculty advisor for teaching at New Mexico State University. He advises faculty in all aspects of traditional and non-traditional teaching and teaches graduate courses in distance learning and college teaching. As president of his own consulting firm, Educational Development Associates, he conducts seminars internationally in teaching with interactive television and the merging technologies.

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64

# The Enrichment of the Learning Experience of Remote Students Through Modern Communication Technology

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## Introduction

The Engineering Management Program in the College of Engineering and Applied Science at the University of Colorado at Boulder offers a Master in Engineering (M.E.) for working, professional engineers preparing for management positions. The program is offered to traditional, on-campus students and to remote students through the Colorado Advanced Training in Engineering and Computer Science (CATECS) program. CATECS provides the studio-classrooms, broadcasts live televised courses to a number of company sites located along the Colorado Front Range, and produces videotapes for those students outside the broadcast area. The live television broadcasts are one-way video and two-way audio.

Each year, approximately 50 students are admitted to the program, and at any one time, approximately 130 students are active in the program. Students are required to have at least two years of professional work experience to be admitted to the program. About 90% of the students are at remote sites throughout the United States and around the world. There are some sites where several active students are clustered, but there are also many students who are isolated at a particular site.

## Motivation for Learning Enrichment

The Engineering Management Program has operated successfully since 1987. In its early days, most of the students were from companies in the Denver-Boulder metropolitan area with many taking the courses via live television. Contact with these students was relatively easy. Student meetings, special class events, seminars, etc. could be scheduled on the Boulder campus with an expectation that many of the metro-area students could attend. Since that time, the situation has changed dramatically. As previously discussed, students are now widely distributed with physical separation and time zone differences creating a sense of isolation. Even students in the metropolitan area often take the courses by videotape instead of by live television because of demanding work and business travel schedules. As a result, some remote students reach the final phases of the graduate program before they have ever had direct face-to-face contact with faculty members, and in fact, may never have direct contact with other students.

The need for support of distance learners through some combination of student-instructor and student-student interactions has been pointed out as a factor in enriching the learning experience (Threlkeld and Brzoska, 1994).

Research findings have provided important insight on these learning interactions:

- In using Internet interactions, the faculty's role may become more of a collaborator or a mentor in the learning process (Updegrove, 1995).

- Timely feedback regarding course assignments and projects is highly valued by distance learners (Egan, et. al., 1991).

- Learners in frequent contact with the instructor are more motivated. (Coldeway, et. al., 1980).

- Small learning groups provide significant benefit to distance learners by fostering support and encouragement and the feeling that if help is needed it is readily available. (Gottschalk, 1996).

- Distance learners who are working professionals or have significant work experience bring a variety of experiences from their work history that could be shared to enrich the learning experience (Daughton, 1996).

## Enrichment Initiatives Utilizing Communication Technology

The program faculty members have embraced the idea of a broad based learning enrichment initiative comprised of team learning projects, student-instructor email communication, email class discussion groups and information posting, web-based class and program information, and desktop video conferencing. This paper reports on the nature of each of these components and the experience to date with each of them.

### Team Learning Projects

In the past three years, class projects involving teams of four to seven students have been used in two courses in the program. While other courses have used pairs of students for assignments or mutual mentoring, these two courses utilize relatively large groups of students in team projects. The way these teams are formed and how they function have been described previously (Daughton, 1996). These large team learning projects address the specific need for close student-student interactions and, given the situation of the students, are realistically possible because of the internet for communication and data sharing.

### Student-Instructor Email Communication

With students spread all over the world, the use of traditional office hours as a way of facilitating student-instructor interaction is not practical. Even for those students who reside in close proximity to the Boulder campus, traditional meetings with faculty are inconvenient due to the heavy workloads, business travel and meetings, and family commitments. Continuous asynchronous communication provides the most realistic student-instructor interaction.

### Email Class Discussion Groups

In all the courses in the program, a class discussion list is constructed through the university computer system. Class members subscribe to the list and then can post and receive messages to it. The class instructors often either suggest or assign topics for list discussion and ask for student input. These topics are linked to the course material and provide a way to bring out the experiences the students have had with these topics. Equally likely is the unassigned posting of questions, ideas, or comments by students that often lead to vigorous, self-sustaining list discussions between students. This medium is also useful for posting by the instructor of information of general importance and interest to the class. The key factor here is that all of this interaction is asynchronous and provides a way for all members of the class to participate. These email class lists facilitate student-student interactions, providing an important vehicle for collaborative learning.

### Web-Based Class and Program Information

The Engineering Management Program has a home page listed under departments and programs on the University of Colorado at Boulder home page. While this home page provides general information on the program, the real value in this context is the information on each course and on the students enrolled in the program. The page for each course provides a syllabus and a location for comments about the course. There is no chat room capability for the previously discussed reasons that drive the need for asynchronous communication. Of particular value is the listing of all students enrolled in the program. A brief biography and a picture of each student are included, which serve as enablers for learning interactions. For students looking for partners for the class team projects, the biographies provide a way to identify individuals with similar backgrounds and interests. The pictures enable both students and faculty to have a visual image of the students with whom they are communicating. This often makes it easier for a student to make a first contact with another student whom they otherwise do not know and generally makes interactions more personal.

### Desktop Video Conferencing

This technology seems to hold the most promise for bringing together students and faculty. The faculty had great expectations of beginning to use this technology for regular face-to-face conference with remote students. Since most of our students work in high technology companies, several of which are telecommunication companies, it was believed that there would be wide availability of desktop videoconferencing technology. This was reinforced by the fact that the cost of a basic video conferencing add-on to an existing contemporary PC is only a few hundred dollars. However, much to our surprise, only about 2% of our students have such capability. Clearly, this technology is not pervasive enough to effectively use it to enrich the learning experience at this time.

## Student Feedback

Course evaluation questionnaires, direct requests by course instructors for feedback, and voluntary surveys of students have been utilized to generate data on how the students view these components intended to enrich the learning experience. When the desktop video conferencing idea was proposed to the student population, the feedback on the availability of this technology is that it is probably 1–3 years away for most individuals. Feedback on office hours being replaced by continuous email is very positive. With time zone differences, business travel, and meetings, it is difficult for faculty members to interact with students either in person or by telephone. As a result, email is the preferred method of communication. Also, for important class announcements, the class discussion list provides a convenient way to reach everyone with the information. Another important benefit is that students spend more time framing their questions, and the instructors provide more in-depth and thoughtful responses. Both the email class lists and class team projects have survey results focused on their effectiveness for learning enrichment. Approximately 72% of survey respondents to date viewed the overall experience of working on a team project as very good to great while 65% indicated the team project was useful to very useful in learning enrichment. On the use of email class discussion groups, the overall experience was rated as very good to great by 65% of the respondents with 64% rating the experience as useful to very useful in enhancing their sense of belonging to the program. The student biographies and pictures along with the course syllabi and information on the program home page are only in their first year. Informal feedback from the students indicates that a home page is a very good idea and provides tangible evidence of belonging to a program at a major university. Students seem to enjoy seeing pictures of themselves and their classmates on this home page.

## Summary

With the exception of desktop videoconference technology, whose effectiveness is yet to be determined, the broad based learning enrichment initiative based on modern communication technology appears to be meeting its objective and is being largely embraced by our students. The home page content appears to have real promise but still needs to be fully implemented. It is expected that students will access this page more frequently once all its features are fully in place. The experience to date indicates that fairly large, physically remote student teams can be successfully employed for class projects in distance education courses facilitated by the internet for communication and exchange of data files. The use of the email class discussion lists and email for student-instructor communication has proven to be particularly valuable. With ready email access and considerable skill in using this technology, our students are as at ease in using this medium. The asynchronous nature of this technology is its most appealing feature. While a small percentage of survey respondents report some difficulty in participating in class team projects and in the email class discussion groups, the overall response is very supportive of these components in enriching the learning experience. The challenge for our faculty is to continue to reduce the barriers to the use of this technology for student-student and faculty-student interactions.

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### Autobiographical Sketch

**William J. Daughton** is a professor of Engineering Management and director of the Engineering Management Program at the University of Colorado at Boulder. He has over 15 years of middle and senior management experience in high technology industry at Texas Instruments, NCR, and AT&T as well as significant college teaching experience in science, engineering, and engineering management. He holds a Ph.D. in solid state physics from the University of Missouri at Columbia.

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# Anatomy of a Nationwide Collaborative Based on a Satellite Event

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## Abstract

The League of Women Voters and PBS Adult Learning Service cooperated over several years to create and disseminate a premiere live satellite event on March 19, 1997, to over 750 sites nationwide. This program, dealing with the critical local issue of water quality, drew together top experts to motivate an informed national dialogue, followed by intense local discussion and planning. The national infrastructure of the League of Women Voters with its local chapters was drawn into cooperation with local colleges, schools, public television stations, environmental groups, and local and state policy-making bodies to participate in this landmark event.

The presentation addresses key factors in the success of those partnerships, from both the national and local levels. Many lessons have been learned from the development and delivery of this model national distance education program. These will be shared with the participants—from funding and fund raising to national marketing, local promotion and program development.

## Program Design and Goal

On March 19, 1997, the League of Women Voters Education Fund (LWVEF), PBS Adult Learning Satellite Service, the U.S. Environmental Protection Agency and a number of national partners sponsored *Tools for Drinking Water Protection*. The program was a 90-minute live satellite broadcast with an interactive panel discussion, accompanied with local forums at most sites. The goal of the extended outreach effort was to trigger local work and encourage the formation or continuation of coalitions to protect local drinking water supplies. Groups of citizens, local officials and drinking water experts gathered at 766 sites in all fifty states, Puerto Rico, the Virgin Islands, Canada and Brazil. Local sites were organized and cosponsored by Leagues of Women Voters, departments of public health, water utilities, USDA Natural Resources Conservation Service offices, cooperative extension offices, community colleges, high schools and other groups (Table 1).

The four tools discussed were land use planning, public education, water quality monitoring and contingency planning. The message for participants is that local communities have the power and the tools to protect their drinking water supplies. The panel of experts included:

Dusty Hall, Environmental Protection Manager, Dayton, Ohio; Bonnie Holz, Director of Environmental Health, Brown, Nicollet, Cottonwood, Watonwan and Redwood Counties, MN; Ken Lustig, Director of Environmental Health, Coeur d'Alene, Idaho; and Jon Witten, President, Horsley and Witten, Inc. Valerie Lemmie, City Manager of Dayton, OH was a special guest. Pre-taped case studies were used to enhance the discussion. In addition to answering questions by fax, telephone, and Internet, the national panel discussed planning and management tools communities can use to create successful protection programs.

**Table 1. Types of Site Hosts**

| Type of Site Hosts | Number of Sites |
|---|---|
| Governmental | 248 |
| Public College | 241 |
| Private College | 25 |
| League of Women Voters Chapters | 81 |
| Agencies | 54 |
| Businesses | 28 |
| Hospitals | 5 |
| Libraries | 5 |
| Public Television Stations | 7 |
| Schools K–12 | 32 |
| Other | 40 |
| Total | 766 |

Site facilitators received marketing materials that could be modified to include local site information, site organizer/facilitator guides to help them plan and coordinate the local workshop component of the program and masters for participant materials. A dedicated Web site was developed with information on the videoconference, on-line registration, a map of sites with contact information and a forum to submit questions to the national experts before, during and after the conference.

### Context of Planning This National Event

The acknowledgement of the need for local community involvement in drinking water protection began with the passage of the Safe Drinking Water Act in 1986. Included in the act was a program called The Wellhead Protection Program. This program provided limited funding to set up model community programs that relied on highly technical approaches to identify sources of groundwater and potential risks to its quality. However, recognition that limited financial resources would require broader participation by citizens and municipalities spurred a number of grassroots organizing efforts. Among them was the League's Community Groundwater Education Project, operating since the 1990. The project has offered a community leader's training program, model community education grants, the publication *Groundwater Protection: Educating for Action*, a videoconference in 1994 with over 150 downlink sites in the U.S. and most recently this videoconference.

These early efforts have brought to light the fact that protecting drinking water requires stakeholders with a variety of perspectives to work out their differences to ensure the long-term safety of their drinking water supply. It demands environmentalists, city and health officials, industry representatives, developers, utilities and others work together. While not impossible or unprecedented, such coalitions are difficult to achieve, especially on the massive scale that will be required in the United States over the next twenty years.

Planning for the 1997 satellite program began more than two years before the event with the League of Women Voters laying the groundwork and PBS Adult Learning Service joining in the process in the early stages (Table 2).

### Partnerships and Collaboration

A key element to the success of this project was developing partnerships at the national and local levels. The LWVEF designed the program with the guidance of two committees:

- The promotion and outreach committee helped formulate a marketing strategy to recruit site facilitators and encourage participation of the members of a wide variety of groups.
- The technical committee helped design the program content.

This division of labor helped keep the content of the program focused on strategies for local communities and helped focus the efforts of key national partners in recruiting participation, not promoting one speaker, idea or platform.

The national partners provided significant outreach support (Table 3). They donated over 30,000 direct mail addresses as well as placed notices and advertisements in over 10 national publications, including *U.S. Water News* and *American City and County Magazine*. By accessing member publications and internal mailing we were able to reach members of the public health community, planning community and environmental managers directly. In this way, we hoped to encourage people to participate locally to plan, participate or speak at a local meeting. With this strategy, a town planner, water purveyor, or technician at a community college would not be surprised when a League member or cooperative extension agent called to solicit participation and may have been excited and willing to cooperate.

A significant number of sites were cosponsored locally. The local promotion material often listed up to ten partners organizing, funding, coordinating, speaking and participating at sites. The success of this effort was heavily dependent on a committed site facilitator. Videoconference site facilitators often focus on technical elements of organizing a site (securing a facility with satellite capability, providing refreshments, inviting participants, etc.). For this event there were additional demands on the site facilitator that included soliciting co-sponsors, developing a local meeting, selecting a panel or organizing a group discussion. A number of site facilitators rose to that challenge.

**Table 2. Time Line and Task Responsibility**

| Time Period | League of Women Voters | PBS Adult Learning Service |
|---|---|---|
| Laying the Groundwork<br>Feb 95–Jan 96 | Define Goals<br>Find partners<br>Raise funds<br>Research program content<br>Establish League promotional team<br>Establish League technical team | Participate in technical team meetings |
| Developing the Program<br>Feb 96–Sept 96 | Set date, select producer<br>Sign contracts<br>Refine specific roles of partners<br>Build the program concept/select speakers<br>Develop informational sheets<br>Coordinate outreach with national partners<br>Recruit local site facilitators<br>Develop site facilitators guide | Set date, approve producer<br>Sign contracts<br>Develop/mail brochures |
| The Countdown<br>Oct 96–Mar 97 | Develop dedicated web site for content<br>Promote to key League leaders<br>Contract for production studio<br>Get script approvals<br>Develop graphics and roll-in's<br>Hire moderator<br>Develop participant print materials | Telemarketing to colleges and others<br>Develop Web site for licensing and promotional materials<br>License sites; monitor lists<br>Develop clickable Web map<br>Book uplinks and transponders<br>Send site coordination materials to sites<br>Send participant materials to sites |
| The Last Days<br>Mar 18–19, 1997 | Prepare moderator<br>Conduct technical and content rehearsals<br>Recruit and train phone/fax operators<br>Produce and uplink program | Run final site list<br>Distribute program<br>Provide technical support to sites |
| Follow-up<br>Mar 20, 1997 and following | Summarize participant evaluations<br>In-depth follow-up with selected sites<br>Develop leader's guide | Summarize Site<br>Coordinators' evaluations |

**Table 3. National Partners**

| Major Funders | Additional Supporting Organizations |
|---|---|
| U.S. Environmental Protection Agency | American Forest Foundation |
| The Chlorine Chemistry Council | American Planning Association |
| The McKnight Foundation | American Water Resources Association |
| Monsanto Company | American Water Works Association |
| National Association of County and City Health Officials | Association of State Drinking Water Administrators |
| USDA National Resources Conservation Service | Association of State and Territorial Health Officials |
| Wheelabrator Technologies/Rust International Charitable Foundation | Blue Thumb Project/National Drinking Water Week Alliance |
| | Concern, Inc. |
| | Environmental Alliance for Senior Involvement |
| | Environmental Defense Fund—Pollution Prevention Alliance |
| | Environmental and Energy Study Institute |
| | Farm*A*Syst/Home*A*Syst |
| | Freshwater Foundation |
| | Friends of the Earth |
| | Great Lakes United |
| | Ground Water Protection Council |
| | Know Your Watershed |
| | Conservation Technology Information Center |
| | National Association of Conservation Districts |
| | National Association of Counties |
| | National Association of Towns and Townships |
| | National Drinking Water Clearinghouse |
| | National Ground Water Association |
| | River Network |
| | Terrene Institute |
| | The Groundwater Foundation |
| | The National Geographic Society |
| | USDA Cooperative State Research, Education and Extension Service |
| | U.S. Geological Survey |
| | Water Environment Federation |

## Innovative Uses of the Internet

While pushing the videoconferencing envelope through developing a grass-roots program of this magnitude, both PBS and the League of Women Voters also wanted to expand how we were using the Internet. E-mail became a standard means of communications for administrative purposes between our offices and among the various people working on the project. With three people in the League office and six primary people at PBS, e-mail helped communications flow effectively among all involved. Communication with League Chapters was also managed principally through Internet.

PBS had also developed an active Web presence during this past year for marketing satellite programs, and *Tools for Drinking Water Protection* was one of the programs that received high visibility on the ALS pages through its distinctive logo, description of program objectives, identification of target audience. Approximately 500 people per week visited these program pages in the months before the program, and so this visibility was a key contributor to awareness of the program.

We also used this program as a pioneer for licensing directly on the Web. Institutions that wanted to license the program needed only to complete the license information form on the Web and click to send it through. The next step for these newly licensed sites was another innovation: they were immediately given the option to download prepared promotional materials that they could print out, customize for their own sites and duplicate. There was no wait for the license to be processed and the re-marketing materials to be mailed. In order to maintain the formatting of the original design and to make the files available to users on multiple computer platforms, the materials were offered in Adobe's Portable Document Format, or PDF. PDF files can be viewed and printed with Adobe's free Acrobat Reader software.

Another innovation was the development of a clickable map of the United States that identified by color code the states where licenses had been issued. Visitors to the Web page were able to tell quickly which states had sites, and, by clicking on a state, see a list of the licensed institutions with contact names and phone numbers. This map was useful initially for institutions considering licensing because they could quickly see whether their area was already well served; the map was useful later for people who were interested in attending the program and needed to locate the most convenient site.

The Web was also used to gather questions before the satellite event, throughout the day of the event, and afterwards. Approximately 60 Internet questions came in during the program, in addition to the phone and fax questions, and many questions continued to come in after the program. Program experts responded to the questions on the Web.

## Evaluation

This videoconference was the single most expansive event in the arena of community-based drinking water protection. The aspirations of the videoconference partners were not only to provide technical guidance but to have the event serve as a catalyst and support for building coalitions. Evaluation of this project has both short-term and long-term phases.

### Short-Term Evaluation

Short-term qualitative and quantitative evaluation looked at site support services and program content and reach. The tools were the site facilitator and participant evaluations as well as anecdotal information.

Sites reported that, on the average, 20.4 people watched the program live, for a total estimated live viewing audience of over 15,600. In addition, sites reported that they expected an average of 73.5 viewers for the taped program during the coming six months, for another 56,000 people. Providing cable distribution rights to sites accounted in part for this number. Site coordinators ranked the "knowledgeable panelists" and "up-to-date information" as the strongest aspects of the program, which, overall received a rating of 9.1 out of 10, an exceptionally high rating. The variety of downlink sites and sponsors is a good first indication that we reached a broad range of target stakeholders and viewers with very diverse interests.

There is a continual timing conflict in planning a videoconference to reach such a wide audience. University audiences prefer midweek, daytime sessions while volunteers who do this on their free time would prefer late, evening or weekend time slots and are interested in obtaining low cost or donated facilities. We followed the advice of videoconference producers and held it during the day, and although successful in our outreach we may attempt an evening event in the future.

The use of the World Wide Web and Internet greatly facilitated communications around the program and was a critical contributor to the success. Some site coordinators, however, were anxious about using the technology and did not have upgraded computer equipment to handle the Adobe Acrobat files. Participating sites also needed to be reminded to look at the Web site for updates on a regular basis.

### Long-Term Evaluation

In the months ahead the evaluation work will examine the coalition building process as well as the effectiveness of the guidance and support systems provided to site facilitators. The League of Women Voters has contracted with an outside evaluator to convene a focus group of ten site facilitators to explore strategies they used for recruiting audiences, organizing local events and building coalitions, as well as identify ways to improve support and guidance to them for future activities. This discussion will also identify parameters to be examined in follow-up focus groups of videoconference participants to be held at ten downlink sites.

## Summary

With more than two years of planning, dozens of partnering organizations, and hundreds of people providing leadership at the national and local levels, *Tools for Drinking Water Production* has more than met the goals of providing critical information nationally, triggering local coalitions, and using cost-effective satellite video distribution with Internet support. Both the League of Women Voters Education Fund and PBS agree that the preliminary external and internal evaluations point to a model of collaborative success.

## Autobiographical Sketches

**Shirley M. Davis** joined PBS Adult Learning Service as Associate Director in 1991. In that position she is responsible for coordinating all aspects of live satellite events from topic identification, through budget development, program design, marketing, production, delivery and evaluation. She is also participating in the development of a programming and delivery strategy for PBS' new Ready to Earn service and Web-based education. Before coming to PBS she was Director of Media-Based Programs at Purdue University. With bachelors and masters degrees in English and additional training in instructional design and adult education, Davis has been a frequent author and workshop leader in distance education.

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**Elana Cohen** is the Program Manager for water resources projects at the League the Women Voters Education Fund. In this position she manages the water resource citizen education and involvement programs, including a drinking water project and a wetlands education effort. Components of the program include citizen education workshops and publications. She is responsible for fundraising, program development and project implementation for all projects. Prior to joining the League, Ms. Cohen worked as the Children's Education Coordinator for the Massachusetts Horticultural Society. Ms. Cohen holds a B.A. from Brandeis University and a Master's in Environmental Studies from the Yale School of Forestry and Environmental Studies. She joined the League in 1994.

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# Helping Students Through the Hoops: Advising in a Distance Education Program

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## Introduction

Faculty from the five University of Wisconsin nursing programs have collaborated to develop and implement a nursing curriculum for registered nurses to earn a Bachelor of Science in Nursing degree. This program, the Collaborative Nursing Program or CNP, is offered using distance education strategies. Students enroll in nursing courses through their home institution but are located at multiple sites around the state of Wisconsin. The nursing courses required for a baccalaureate degree are taught by faculty from all five of the nursing programs, with each program contributing at least one core course and one elective in nursing. The distance education technologies used include audiographics, compressed video, public television, ETN (the educational telephone network), and the internet.

The "home institution" concept requires that students meet the degree requirements of that institution. It is from their home institution that students earn their degree and from which they receive their academic advising. However, students may take nonnursing, general education courses at their home institution or at a college or university located near their place of residence. Independent study courses, such as those offered by UW-Extension, which carry academic credit, are encouraged.

There are many advising issues which challenge the CNP advisors. Students are typically nontraditional in age and immersed in multiple roles, particularly those of spouse, parent, and employee. It is these latter that also make the student geographically bound. Students have prior educational experiences, but the only commonality is that each has completed a diploma in nursing (hospital-based program) or an associate degree in nursing (technical or community college-based program) and are registered nurses.

The prior nonnursing academic work varies significantly from student to student. It may be recent or from the far distant past. It may represent the highest standards of academic performance or not. Transfer courses vary in academic rigor and may or may not be equivalent to campus-based courses. Advising the student regarding strategies for meeting the requirements for admission to nursing involves decisions about course selection, repeating of courses, testing out of requirements, and consulting department chairs regarding coursework from another institution. This is time-consuming for student and advisor alike. The registered nurse student is goal-oriented and focused on achieving that goal in an efficient and cost-effective manner.

## Advising Issues

### Competition

Although the five nursing programs have collaborated to provide a single nursing curriculum, the students look at their options in a competitive framework. Which of the five home institutions will provide the "best deal," given their unique background and circumstances? Most students matriculate in the nursing program nearest them; however, because there are some differences in the general education requirements for each home institution's degree, as well as in articulation agreements with technical colleges, there is some "shopping around," especially in regions in which the institutions' service areas overlap. Advisors need to help students compare requirements, using accurate information and considering all the implications of the selection of a home institution.

### Connection

Because registered nurse students are not on campus for classes, or come only for classes, they do not become connected to the network of campus information available informally to most other undergraduate students. Many RN students are "academically naive" and do not have an accurate sense of what the university offers them, as well as what is expected of them as students. The on-campus advisor serves as the student's connection to the home institution's student services, registration information, and mechanisms for determining equivalency of off-campus courses. Because advisors are advising students at off-campus sites, they need to be the link to those other campuses and academic institutions which provide general education courses and student services when RNs are enrolled there.

### Collaboration

Collaboration among the five campuses continues through a committee structure, one of which is the CNP Advisors' Committee. This committee provides a mechanism for advisors to clarify academic policies at each of the home institutions, to anticipate issues related to different academic calendars and different academic requirements, and to facilitate student transfer when the student so decides.

An important collaborative process is also that between the advisor and the registered nurse student. Moving the student from a framework of "Tell me what I have to do" to one of looking at one's options and making decisions, is an on-going process.

## Advising Tools and Strategies

One of the first advising strategies is to help students understand the two components of a baccalaureate degree: the home institution's general education and other institutional requirements for a degree, and the CNP's nursing curriculum. This differentiation facilitates the student's ability to negotiate the system in dealing with their academic issues and problems.

Most initial contacts are made via telephone, either directly to the advisor or by way of the University's Higher Education Location Program (HELP). Information about the program and the student's academic credentials are exchanged with the advisor in person or through the mail. Transcripts are submitted and evaluated in terms of progress toward the degree.

Forms showing degree requirements are used as check lists, providing the student a visual outline of the degree and the advisor a basis for continuing advising and updating of a student's progress. Subsequent phone conversations are the usual mechanism for providing advice about remaining requirements, course selections at whatever site, and timing of admission applications.

Occasional students have made contacts with advisors by electronic mail, but data collected from students indicates that less than 50% have e-mail access. Those who have access at work utilize the system to send messages out but prefer not to receive academic information/advising at a work site. Similarly, students do not have access to facsimile transmission with the exception of some work site facilities. These strategies continue to be viewed as feasible supports for future advising of students at a distance.

Teleconferencing technology, incorporating desktop video at designated sites, is being considered as a strategy to increase the personal contact between advisor and advisee. Before making such an investment, it is important to determine what are students' perceptions of their program advising. Has it been timely, relevant to their needs, and individualized? How do advisees perceive the quality of the advising received? What is their usual mechanism of interaction with the advisor, and are advisees satisfied?

### Student Perception of Advising

In spring 1997, an advising survey was mailed to 188 registered nurses who have enrolled in at least one nursing course in the Collaborative Nursing Program. Eighty nurses returned a survey, a 43% response rate. Of those, 19% were taking their first nursing course, and 81% were in their 2nd or 3rd semester of nursing courses.

On average, the RN students are located 50.9 miles from their advisor. Nevertheless, within the past year, each has made contact with an advisor between one and five times, averaging 3.45 visits in the year. Students provided responses about their usual mode of interaction with their advisor and their preferred mode. They also provided responses indicating their perceptions of the timeliness, relevance, and individualization of the advice and the availability of the advisor. These data will be presented.

### Summary

The development of a distance education academic program leading to a degree involves overcoming many barriers, including how to provide accurate and timely advising to students at a distance. When the program is a result of a collaborative effort among five separate institutions with differing general education requirements, with linkages to multiple two- and four-year campuses, confusion on the part of students cam be expected. Guiding students through the various systems in academia and helping them through the hoops toward a degree is a challenge for the on-campus advisor.

### Autobiographical Sketches

**Sandra Dirks** is an associate professor in the department of Nursing Systems at the University of Wisconsin-Eau Claire. She teaches basic undergraduate nursing courses as well as nursing courses in the Collaborative Nursing Program. She serves as advisor the registered nurse students and is UW-EC representative on the Collaborative Nursing Program planning and advising committees.

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**Sharon Nellis** is an administrative assistant in the School of Nursing at University of Wisconsin-Madison and undergraduate nursing student advisor. As Coordinator of the Collaborative Nursing Program, she maintains the data base of registered nurse students in the program and serves as the communication and coordination center for faculty and advisors in the CNP.

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# Cutting Off the Talking Head: Multidimensional Presentations in the Distance Education Classroom

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A challenge facing those engaged in teaching a distance education course involves gaining and keeping the attention of the learners. A class which lends itself to the utilization of "hands on" activities spares a teacher somewhat from this difficulty, but a subject such as United States History offers the distance education instructor few such opportunities. This does not, however, mean that students in a History, Political Science, or Sociology class must endure the numbing experience of simply watching a "talking head" for the entire class period; although it requires thought, time, and practice, a teacher in those subject areas can develop techniques for delivering information in a stimulating and pedagogically valid fashion. During the course of my presentation, I will attempt to demonstrate some of the methods I use in the process of "cutting off the talking head."

In my presentation, I will first focus on the use of visuals. A great deal of how instructors utilize pictures or artifacts depends on the technology available to them in the rooms from which they broadcast. At Eastern New Mexico University, where I teach, we have an overhead projector which can actually show a photograph or an object with perfect clarity. This allows me to immediately switch from a discussion of a historical personage, such as Frederick Douglass, to the presentation of a likeness of him. I can then follow up by putting on the projector an object which was used during the era of slavery, such as a thumbscrew. Obviously, individuals who teach at locations that do not have this type of capability have to work harder at presenting visual images, but it can be done. I will suggest methods that teachers working with this technological limitation can utilize to give their students a way to visualize History as well as hear or read about it.

My presentation will then turn to a discussion of how best to utilize maps. Once again, the technology at Eastern New Mexico University permits me to use the projector that I previously mentioned to give the students a look at the places where the events which we are discussing actually took place. Our projector allows me to zoom in on a specific area, or zoom out to see a larger region. This last technique is especially helpful when discussing migrations in history, developments in transportation, and similar situations. Individuals who do not possess this same capability can always bring the use of maps into their setting by having students bring books with maps with them into class, but I will suggest in my presentation methods by which they can make even less sophisticated broadcast technology work for them. I will discuss how wall maps can best be used if that is the only possibility, but I will also suggest ways that map imagery can also be delivered to the students through the use of other devices which may be at the disposal of the instructors.

One of the methods which instructors can use for integrating maps into a distance education class involves another device which may or may not be available at all sites—a computer. All of the distance education classrooms at Eastern New Mexico University have a computer in them; the panel which we use to command the technological devices at our disposal can switch the signal being broadcast from the regular camera to the image on our computer screens. This offers the instructors two methods by which to generate maps in a distance education environment. First, there are many sites on the World Wide Web which include maps. These, in addition to containing maps which show political boundaries, often have maps which display topographic or demographic information. And second, various programs available on our computers allow us to actually create maps. Drawing a map, and then adding in details as they go along, allows instructors to graphically illustrate unfolding patterns of historical development, and do so in a manner much more striking than simply drawing on a chalkboard can. During the course of my presentation, I will give some suggestions about how to incorporate the use of computers in connection with map work in a distance education setting even if that technology is not readily available in the broadcast room.

Computers are, of course, useful for much more than merely generating maps. I am a firm believer in the ability of computers to enhance the process of instructing students about History, especially in a distance education setting. Many of us require our students to do a research paper as a part of our class, an assignment which demands that the students find materials outside of the ordinary confines of the meeting period. Such assignments present a distinct difficulty to distance education students, who often cannot visit a library with their instructors to learn what materials are available. Our classroom computers at Eastern New Mexico University give us the ability to connect with the website of our library, which then allows us to demonstrate to our students at the outlying sites how to access the search mechanisms that enable them to scan the holdings in a certain area. Rather than simply stand up before the camera and tell the students the steps by which to conduct a search, the instructor can use the computer to demonstrate the relevant investigation techniques.

Although it must be approached with caution, the Internet also can provide distance education students with important sources of information. Our computers at Eastern New Mexico University allow us to plug into the Net, thus giving us the ability to show our students how to search for sites which they can use to gather material for use in their papers. Not every site will prove helpful, however, so I will include in my presentation a few tips about how instructors can learn to show the difference between valid and invalid sites. While the Internet offers the distinct potential for misuse, instructors can learn how to set guidelines to at least mitigate the opportunities for misuse.

History lends itself to treatment on film extremely well, and this quality offers another method for instructors to broaden their presentations beyond merely lecturing. Whether a documentary or a Hollywood production, films have the ability to consider historical subjects in an engaging fashion. All of our distance education classrooms at Eastern New Mexico University have a video cassette player in them, and, here again, our control panels allow us to change the signal going out to the various sites from the regular camera to the image coming out of the machine. The potential for this capability is limitless. For example, rather than simply telling students what Franklin D. Roosevelt said in his first inaugural address, instructors can put on a video tape of his stirring speech. There are rules and restrictions which obviously apply to what types of materials can be used, but care and prudence will allow instructors to give students a chance to see the process of history, rather than simply hear about it. Here again, suggestions will be offered for those instructors who do not have this video cassette player capability in their distance education classrooms.

Up until this point, all of the items which I have discussed have been of a technological nature. These are of great importance, and understandably must receive treatment in my presentation. But the most important aspect of becoming more than a "talking head" revolves around the way in which instructors actually do their teaching. There are many suggestions which every teacher would benefit from, basically involving voice projection, diction, body posture, and other communication skills. But the distance education format requires that teachers go beyond these basic suggestion to try to develop a technique which will keep those students viewing class on a television monitor engaged for a lengthy period of time. Some of the mechanisms which I have found most useful for broadening my delivery will form the basis for the last half of my presentation. I will first address the issue of a question-and-answer technique. Many distance education instructors are reluctant to ask questions, especially if there is a lag time created when the distance education students try to make contact with the instructors' classrooms (as there is in all of the Eastern New Mexico University classrooms). I will give suggestions about how to overcome this situation, which seems to put distance education students at a disadvantage. I will also offer advice about how to vary the types of questions which are asked, based on the theories of the Social Scientist Jack Zevin. From a discussion about questions, I will then share some thoughts about how you can verbally present information in the most effective fashion. It has been my experience that occasional levity will help keep the attention of distance education learners. To illustrate my thoughts, I will play a few minutes of a tape showing how I try to inject a bit of humor into even the most serious historical subjects.

It is unarguable that distance education offers an opportunity to reach students who would otherwise be denied a significant opportunity. It is also readily apparent that the process can lend itself to the most ineffective teaching style imaginable—instructors simply talking while on camera. My presentation will allow the listeners to hear, and see, about ways of making the distance education experience a vital and dynamic one which is exciting for both the teachers and the pupils.

# A General Model for Evaluating Distance Education Programs

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## Introduction

Whether they are outside evaluation consultants or program staff, people asked to evaluate distance education programs are often caught in the trap of only being able to examine various types of program outcomes: Did the students perform as well as some comparison group? Were the teachers and students satisfied with the distance education experience—perhaps compared to their other (regular) classes? Did the adult learners feel that they had received good value for their tuition dollar?

While the focus on outcomes is very important and in many cases absolutely essential, to focus only on outcomes is to miss the opportunity to address some equally important and essential questions such as:

- If the program was successful, do we know enough about why and how it was successful that we could duplicate the effort or that someone else could attempt to replicate it successfully?
- If the program was not successful, do we know enough about why and how it was not successful that we could recommend appropriate changes in the program so that it could be more successful next time, instead of simply condemning the program to death by neglect?
- Even if the program was "successful," are there things that we could have been sharing with program management and staff that would have made the outcomes even more positive?

In this session we will examine a systematic approach to the evaluation of distance education programs. The general model is one which should enable the evaluator to address the types of questions listed above, and in the process improve the value placed on evaluation as a tool for program planning and program management.

## Four Basic Elements

Outcomes do not just happen. They are the result of a set of planned and serendipitous events and activities which program designers and managers should be very well aware of. The general model proposed here is based on these four basic elements essential to EVERY distance education program:

- **Technological infrastructure (Evaluation Area #1)**—the system, the hardware—what it is, where it is, how well it is maintained, how easily accessible is it to those who will need it; how it the technology changed from the start to the end of the project being evaluated? What about related/connected technological systems?

- **Political infrastructure (Evaluation Area #2)**—the interconnected mass of intra- and inter-organizational relationships and interactions among governing, advisory, user, and other interested stakeholder groups in addressing such issues as financing, staffing, usage, networks, and sustainability; included here could be such administrative outputs as revised compatible schedules, user policies and procedures, and so forth.

- **Instructional development components (Evaluation Area #3)**—the important developmental aspects of most distance education programs including selection of lead teachers (early adaptors); training of and support for teachers and students; communications to potential students; expert resources in the re-formulation of course content for distance education; and the actual distance education course materials—the curriculum outputs.

- **Stakeholder outcomes (Evaluation Area #4)**—the nature and level of performance and satisfaction of the stakeholders in the distance education setting; perceptions of value and suggestions for next steps; changes in networks and systems; and so forth; this is generally (mistakenly) thought to be the make it or break it area in program evaluation.

In addition to the four primary evaluation areas it should be noted that the evaluation team will also have to monitor developments in the geopolitical, economic, and educational environment which may have an impact on the distance education program. For example, a major change in the school board, or a significant cut in support from any primary funding source could drastically impact a distance education program regardless of its quality.

## Relationships Among the Four Basic Elements

Figure 1 illustrates the most straightforward pattern of interconnections among these four basic elements. Put most simply, stakeholder outcomes are directly attributable to the instructional development components of a distance education program, and these are in turn affected by the political and technological infrastructures. The program outcomes do not just happen on their own. The most immediate effect of this simple diagram is to force us to think about HOW and WHY the program accomplishes the good or not so good results, and to look beyond the immediate staff and students to identify other relevant factors.

For those readers who like equations, this concept can be illustrated as follows:

**Stakeholder Outcomes = PI + TI + ID + error,** where

PI = characteristics of the political infrastructure
TI = characteristics of the technological infrastructure
ID = instructional development activities

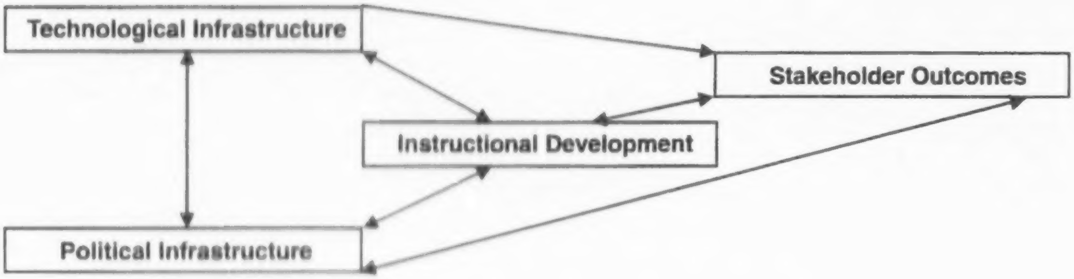

*Figure 1*

## Sample Evaluation Questions by Area

### Evaluation Area #1: Technological Infrastructure

- ❖ What technological equipment, trained personnel and ongoing infrastructure development were in place in the school/district prior to the distance education project?
- ❖ What stakeholder groups were involved in selecting the specific system being used and equipment for the classrooms? What has been the mix of administrative and instructional emphasis?
- ❖ What are the characteristics of the studio and equipment selected, and how are these working in actuality?

### Evaluation Area #2: Political Infrastructure

- ❖ How much collaboration occurred for instructional, staff development, and other areas prior to the distance education project?
- ❖ To what degree were the various stakeholder groups involved in the decision to establish a distance education program?
- ❖ How broadly representative is the governance structure? What are the implications of this?

### Evaluation Area #3: Instructional Development Components

- ❖ What is the role of technology in instruction and staff development at the present time?
- ❖ What processes were used to select lead teachers and courses for each year of the project? What has been the role of various stakeholder groups in this process?
- ❖ How do participating teachers view their role and its impact (both positive and negative) on other aspects of their jobs?

### Evaluation Area #4: Stakeholder Outcomes

- How successful were the courses in attaining the expected student outcomes?
- What factors appear to be correlated with success: student characteristics? teacher preparation? physical environment features?
- How do the major stakeholder groups compare in their assessments of the project? What are the implications for future technology-based initiatives?

## Two Concrete Applications

Many of the sample questions presented above have been adapted from the evaluation of a multi-county, multi-institutional collaborative effort involving close to twenty school districts and several postsecondary institutions. During the presentation we will examine this evaluation more closely using the General Model as our framework.

Time permitting, we will then examine a second example using the evaluation of a graduate social work degree program from Michigan State University. This second example will show how the fine-tuning of the General Model to fit the earlier public school situation can be reworked to fit the specifics of a graduate professional degree program. What remains the same is the importance of looking across several conceptually and practically distinct domains.

## Links to Program Planning and Program Management

The General Model described above provides a framework for a multi-method, multi-purpose effort to address the many functions to which evaluation is asked to contribute. The evaluation effort can be FORMATIVE in that it is designed to provide timely, usable feedback to program management, staff, and other participants in order to enhance any time of "quality improvement" process. The evaluation will also be SUMMATIVE in providing an overall assessment of the impact a distance education program might have. This will require detailing the "baseline" (technological, organizational, and practice-related); describing the level of project implementation; assessing the extent to which project objectives were achieved; providing continuous feedback to enhance project management; and determining the potential for sustainability and longer term impacts. The General Model and its questions supports all of these approaches, but it permits the evaluator and project management to select only those topics and questions that are jointly viewed as important AND for which there are resources.

The General Model approach supports incorporating aspects of what are traditionally considered PROCESS evaluation (how the project operates) and OUTCOME evaluation (the extent to which objectives have been achieved). Research methods to be utilized throughout the evaluation will include both quantitative and qualitative methods as appropriate to the specific research question.

Because the General Model forces the evaluator and program management to think about the connections between areas as well as within them, it forces everyone to deal directly with questions like: if we had handled technology training for teachers differently, what would have been the effect on student and teacher satisfaction scores? Considering this question brings everyone much closer to asking: if I handle technology training in a different way next year, what effect will it have?—and then collecting the data, answering the question, and fine-tuning the technology training again for later training sessions (if possible) and certainly for the following year. This, from my perspective, is what evaluation should be all about.

## Autobiographical Sketch

**Paul P. Freddolino, Ph.D.**, is a professor in the School of Social Work at Michigan State University. He completed his doctoral studies in Sociology at the University of Michigan (1977) and then pursued a two-year postdoctoral program in Mental Health Evaluation Research at UCLA. He has also completed a one-year NIMH-funded postdoctoral fellowship at the Prevention Research Center, University of Michigan. Dr. Freddolino serves as Coordinator of the School's Distance Education Initiative (DEI) which currently supports two cohorts of MSW students at distant sites using electronically-mediated instruction. Professor Freddolino's research work focuses on evaluation studies. In addition to the evaluation of the DEI he is also studying the effectiveness of a fiber-optic distance learning initiative involving the public schools of two counties in Michigan. Other evaluative studies have included mental health, substance abuse, community health, and social service programs.

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# Delivering a Graduate Program Via Distance Learning Technologies: A Collaborative Approach

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Millions of dollars are spent each year by organizations on employee training and development (Industry Report, 1994). To achieve their desired performance outcomes, organizations need individuals who are clearly responsible for enabling employees to perform in their present roles and developing people and organizations for the future (Galagan, 1994). In June of 1995, the University of Wisconsin—Stout began offering a master of science degree in Training and Development. The goal of this program is to prepare human resource development professionals to meet the performance improvement needs of business and industry. Graduates of this program are able to analyze performance needs; design, deliver and evaluate training programs and other performance interventions; and manage and coordinate human resource development efforts.

Response to this program was extremely high and the program is now one of the largest graduate programs at UW—Stout. In addition to requests from students who were interested in enrolling in courses at the UW—Stout campus in Menomonie, the graduate program director also received a number of requests for information and course offerings from students located throughout the state. This paper will explain how this new program was structured, marketed, implemented and evaluated to meet the needs of distant learners.

## Structure of the Program

The master of science degree in training and development consists of 30 credits taken at the graduate level. There are 17 credits of required professional courses; 7 credits of research preparation, including a 4-credit field problem paper and 6 elective credits. Students may transfer in up to 10 graduate credits from other institutions with the approval of the graduate program director.

The courses in the program are delivered primarily through the Communications, Education and Training Department. However, there are also several required and elective courses offered through other departments including the Industrial Management Department, the Business Department and the Psychology Department. Most of the courses are offered on campus one evening per week to accommodate the needs of working adult students.

To deliver the program to off campus students, it was decided to use a combination of delivery systems. The required courses would be offered in a weekend format in a central part of the state. Fort McCoy, near Sparta, Wisconsin, was chosen due to its central location, available facilities and the number of both military and civilian base employees who had expressed interest in the program. The weekend courses would begin in the fall of 1995. Students who enrolled in all of the courses in the suggested weekend sequence would be able to complete their degrees by August 1997.

These weekend courses would be supplemented by numerous other delivery options. At least one course per semester would be offered over the WONDER system, an interactive, fiber-based video network that connects several sites in the state. Courses would also be offered in an electronic format through America On-line. There would also be opportunities for students to earn credits through correspondence courses, independent studies, professional internships, transfer credits and other UW—Stout outreach courses which are offered in various parts of the state. It was believed that this combination of alternatives would provide adequate flexibility for off campus students to complete their degree programs in a timely manner.

## Marketing the Program

This distance learning program is a joint effort between the Office of Continuing Education and the Communications, Education and Training Department. The graduate program director, Julie Furst-Bowe, and the credit outreach program manager, Sandy White, worked jointly on all aspects of the program. It was decided to market the program primarily through direct mail. Information about the program was mailed to all individuals who had inquired about the program. It was also mailed to all of the individuals on the database maintained by the Office of Continuing Education.

Other types of media were also used to promote the program. Newspaper ads were run in the central part of the state and the graduate program director and credit outreach program manager also conducted two informational sessions at Fort McCoy in the summer of 1995. The Education Coordinator at Fort McCoy also promoted the program through print and e-mail. Information about the program can also be found on the UW—Stout web site (http://www.uwstout.edu).

Through the various marketing efforts, the program at Fort McCoy began with approximately 25 students in the fall of 1995. Currently students in the program include training and human resource development professionals from business and industry, military instructors, technical college faculty members and others looking to learn more about this field. The program continues to be promoted in the Continuing Education course schedules and by the graduate program director. Although the weekend course sequence started in the fall of 1995, students can enter the distance program at any time by completing courses they may have missed through any of the delivery systems described above. As a result, enrollment in the program has gradually increased from semester to semester.

## Implementing the Program

The program director and the credit outreach program manager work jointly to staff the courses. The courses are taught by UW—Stout faculty members from several departments and human resource development managers from the private sector, including training professionals from companies such as Wausau Insurance, Miller Brewing and Phillips Plastics. The credit outreach program manager works with the instructor to schedule the course and makes the arrangements for the use of off campus facilities or time on the WONDER system. Both UW—Stout faculty and adjunct instructors are paid through the Office of Continuing Education on a per credit basis. This is typically considered "overload" pay for the UW—Stout faculty members. The credit outreach program manager and her staff typically handle registration, billing, textbooks and course evaluation for off campus and distance education courses.

Academic advisement is typically handled by the graduate program director who visits Fort McCoy and the WONDER sites at least once per semester to answer questions and provide information. The program director also communicates with the distance students on a regular basis using mail, phone, fax and e-mail. Typically, communication with the program director increases as students near the completion of their program and need assistance to file for degree candidacy and begin work on their field problem papers. Because most of these students are employed full-time, they are able to conduct their research in their own organizations. The program director serves as the research advisor for many of these papers although students are allowed select other UW—Stout graduate faculty as their research advisors if they choose. When students have completed the required courses and field problem paper, they are eligible to apply for graduation.

### Evaluating the Program

This program is currently being evaluated on a number of levels. Each course is evaluated by students using a standardized course evaluation form. The results of these evaluations are shared with the instructors, department chairs and the individuals who are responsible for coordinating the program The results of these evaluations are quantified and comparisons have been made between courses being taught via various delivery systems.

In the summer of 1996, a focus group was held with students in the off campus program to obtain qualitative data regarding the strengths and weaknesses of the program (Burntvedt, 1996). Seven students participated in a four-hour group interview on the UW—Stout campus. All of these individuals were employed full-time and reported annual incomes of between $25,000 and $60,000. Their reasons for pursuing this degree included career advancement and career change. Participants indicated they had learned of the program through a number of sources including direct mail, program brochures, newspaper advertisements and conversations with the program director (Burntvedt, 1996).

Several strengths of the program were reported by the respondents including weekend courses, location of courses, cost of the program and the two-year degree sequence. In regard to specific courses, the students had several favorable comments regarding the subject matter presented, the diversity of delivery systems used, the variety of classroom methods used, communication with instructors outside of the classroom and the assistance provided by the program director and the Office of Continuing Education. The students particularly enjoyed the weekend courses, although they found the WONDER courses to be as acceptable as well.

According to the respondents, there were also several areas in need of improvement. It should be noted that most of these concerns are not specific to this master's degree program but would be problematic for any off campus student at UW—Stout at the time of the interviews. The problem areas identified by the participants included confusion between two separate registration systems for on campus and off campus students. There were also problems with acquiring textbooks in a timely manner and in obtaining access to library resources and to the campus computer network. Although students generally favored the manner in which courses were scheduled, they disliked courses being canceled and overlap between the scheduling of two courses in the program. Most of the students disliked the on-line courses for a number of reasons. Students also expressed concerns about the graduate residency requirement which would have required them to take a minimum number of credits at the UW—Stout campus (Burntvedt, 1996).

The concerns of these students and other students enrolled in distance learning programs have been shared on campus with faculty, staff and administrators from a number of areas including the Graduate College, the Registrar's Office, the Office of Continuing Education, Instructional Resource Services, the Library Learning Center and the Communications, Education and Training Department. As a result, several changes have been implemented that will allow distance students better access to textbooks, library materials and on-line resources There have been attempts to streamline the registration process and the graduate residency requirement has been modified to allow distance students to meet the requirement through completing UW—Stout courses at remote sites. Finally, on-line courses are now being developed and delivered in a slightly different manner to better meet the needs of the students.

Based on the results of the course evaluations, the focus group interviews and requests from off-campus students, UW—Stout will be beginning a second two-year sequence of courses in the fall of 1997. Once again, students can complete the program in two years by taking any combination of courses that would enable them to complete the degree requirements. This would include weekend courses at Fort McCoy; WONDER courses in Appleton, Eau Claire, La Crosse and Wausau; courses on the UW—Stout campus; and graduate courses from other institutions that have been approved for use in the program.

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## Autobiographical Sketch

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# Institutional and Instructional Collaboration in Distance Education: Pitfalls and Promises

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Many fine ideas are developed at national and state conferences where colleagues, in a relaxed environment, discuss and brainstorm the issues that effect their fields. Rarely do these ideas get past the napkins on which they have been sketched. This one did. Professors from four Nebraska post secondary institutions discussed the potential of shared instruction across institutional boundaries. Factors, such as, undersubscribed courses on the individual campuses and lack of faculty strength in each field at each institution, led the faculty to believe positive benefits could be identified for students, instructors, and institutions. The statewide satellite system, already in place at three institutions, would facilitate shared instruction. In the fall of 1996 an idea that had been enthusiastically developed by a small group of highly respected, visionary, senior level faculty was implemented. The immediate goal was to meet administrative certification needs of Nebraska teachers.

This summary will provide a brief introduction to the collaborative project. The presentation will outline from the administrative perspective of Academic Telecommunications: the benefits of institutional and instructional collaboration; the challenges and rewards inherent in the collaborative process; and, a model for institutional collaboration. The Division of Continuing Studies, Department of Academic Telecommunications, coordinates and administers University of Nebraska-Lincoln instruction and graduate degree programs delivered by one-way and two-way video to sites across the state. In the administrative process Academic Telecommunications works closely with academic departments, colleges, Nebraska Educational Telecommunications, and Graduate Studies.

## Collaborative Efforts

In an era when institutions are constantly reallocating funds and resources are scarce, the notion of collaboration between post secondary institutions holds positive ramifications. Instructional collaboration can increase productivity and stimulate creativity; enhance the quality of teaching and learning; stimulate risk taking; and maintain motivation (Austin and Baldwin 1991). Institutional collaboration can maximize the use of limited resources both financial and human, and avoid duplication. Administration and regulatory boards espouse the benefits of collaboration.

Collaborative efforts between institutions of higher education are, however, in an embryonic stage. Consequently, not much appears in the literature to guide the collaborative process and even less applies when distance education and team teaching are added to the picture.

The collaborative relationship is extremely complex, they can be difficult to get started and hard to keep on track (McGill and Johnstone 1994). Even when faculty agree to be involved it is not always easy to keep them committed to the overall goals of the group as a whole or to work as a unified group without the encumbrance of "home" campus mentality and separate agendas. Many environmental factors such as, political climate, resources, and history of working together, can enhance or inhibit collaborative relationships and need to be addressed. The natural competition between institutions has to be over-come.

### Institutional Background

The institutions involved in the collaborative effort include two campuses of a land grant university, and two state colleges. The four institutions represent the southeast, northeast, middle, and northwest geographical areas of the state. Two time zones are represented. Tuition is not uniform among campuses. The four campuses have similar but not identical academic calendars. Institutions had differing levels of experience with distance teaching. Additionally, the administration of televised distance education varied widely among the institutions. On one campus academic units work closely with the Division of Continuing Studies to deliver distance courses; on 2 campuses there was less coordination between continuing studies units and academic units, and the fourth was just getting involved in distance teaching/learning.

### Technology

NEB*SAT, Nebraska's multiple-channel and optical fiber educational telecommunications network, has established a comprehensive and coordinated network for originating and receiving sites across Nebraska to serve the state's citizens. Three of the institutions were equipped and had been involved in televised distance education for several years. The fourth institution anticipated having a classroom and being capable by the fall of 1996 to receive and originate instruction. Compressed two-way video/two-way audio was selected as the delivery mode. Nebraska Educational Telecommunications is the administrative unit for NEB*SAT.

### The Journey

And so it was, with this multiple of variables, that UNL, UNK, Wayne State College, and Chadron State College came together in the fall of 1996 to deliver two graduate courses intended to begin to meet the administrative certification needs of teachers across the state of Nebraska.

Stephen Covey talks about "starting with the end in mind." The faculty had a vision and knew the outcomes they wanted to achieve. They agreed to team teach two graduate courses which would meet on alternate Saturdays for an academic year. Their purpose was: (1) to more effectively meet the needs of students interested in earning administrative certification by providing needed courses to numerous sites throughout Nebraska; (2) to provide the most qualified instructors in each course area to students around the state (recognizing that none of the four campuses have specialists in every area); (3) to encourage team teaching. Covey's "begin with the end in mind" is based on the principle that all things are created twice. First a mental creation, secondly a physical creation. "If you want to have a successful enterprise you clearly define what you are trying to accomplish. You carefully think through the product or service you want to provide in terms of your market target, then you organize all the elements . . . to meet that objective" (Covey 1989). Although the faculty had a clear mental vision of the outcomes, the path (physical creation) to achievement was less clearly defined.

## Potholes

From the viewpoint of Academic Telecommunications four major components needed to be included in the organizational development of a collaborative program:

- An administrative component, made up of deans and department chairs
- A financial component, comprised of financial officers
- A continuing education component, comprised of appropriate campus units
- An instructional component, comprised of faculty

**Administrative component.** During the first year there was no unified administrative support. Faculty were independently going to involve the appropriate deans and department chairs from their campuses. This occurred to various extents.

**Financial component.** No financial arrangements were made. Each campus had varying tuition rates and retained their tuition and fees. Campuses independently marketed the program.

**Continuing education component.** The campuses varied in how they worked with their continuing education units. On three campuses the continuing education units were primarily involved in scheduling and technical support, on one campus the continuing studies unit registered students, provided administrative, faculty and student support services, as well as scheduling and technical support. The continuing education units had varying degrees of responsibility to the project.

**Instructional component.** Four faculty volunteered from three campuses to teach the two courses. One course was shared between Chadron State and UNL, the second between UNL and UNK. Although faculty had agreed to the project, communication among faculty was difficult to establish and maintain. Faculty are notoriously independent when it comes to the design of their courses, they do not easily share or open their syllabus to scrutiny. These factors lead to a great deal of frustration. Communication breakdown was exacerbated by geographic distance—faculty could not meet "over coffee" in a collegial fashion and discuss the issues. Though they supported the notion of distance education, communication via the use of technology, i.e. e-mail, teleconference, and videoconference, did not occur frequently.

From the beginning the notion of collaboration did not seem to be clearly defined among faculty. In a truly collaborative environment the structure and process support the purpose (National Network 1995). The purpose was clear, however, the infrastructure, shared ideas and decision making, formalized roles, work assignments, high leadership, and highly developed communication was not in place. Obstacles created by the political environment among institutions prevented faculty from taking leadership roles. Consequently critical decisions were not made in a timely manner. Tough decisions were not made regarding course content. Instead, courses were loosely organized, each faculty member basically teaching the class as they always had. Independently, faculty selected and scheduled downlink sites, changed class meeting times and withdrew from selected parts of the project.

By the end of the first semester the frustration level of everyone involved was extremely high. Frustration became the catalyst which brought the group together and actually began to build the collaborative environment. Another type of catalyst, a convener, was instrumental and necessary to keep the project alive. A convener, "is the person who calls the initial meeting of a collaboration and draws everyone into dialog about possible solutions to the situation. If the collaboration is to move forward and establish a shared vision, the convener must have organizational and interpersonal skills and must carry the role with passion and fairness" (National Network 1995). The convener in this case was at UNL and he encouraged his dean to involve the deans from the other three campuses. In December of 1996, a video conference which included faculty, deans, department chairs, continuing education representatives, a member of the Post Secondary Coordinating Commission and NET came together to make decisions about the future. First and foremost, frustrations aside, the purposes were being met—students were being served. With the benefits of the project apparent, each group openly discussed their concerns, as well as the obstacles encountered. Due to her neutrality the director of Academic Telecommunications was able to develop the organizational model by defining the four levels of involvement necessary: administrative, financial, continuing education, and instructional.

As a result of this video conference a face-to-face faculty meeting was held which proved to be very productive. At this meeting the infrastructure critical to a collaboration emerged. Ideas and decision making were shared, work assignments were given, and leadership and communication were established. Collaboration is a process of negotiation and no faculty member or institution can be completely satisfied. Faculty developed a set of assumptions that would guide them, restructured class meeting times, settled on sites, developed timelines, methods of delivery, minimum numbers of students necessary per site, and chose courses and faculty for the next year. None of these tasks were easily accomplished; each campus gave in to one or more requirements of the group.

## Conclusion

It has been said that collaboration is a bit like teaching a dinosaur to dance—it has its awkward moments (National Network 1995)! However when the process comes together it is a dynamic, motivating, and rewarding experience for all involved. These four institutions have a long way to go, but a process has begun that will, with patience, continue to evolve and has the potential to serve the students, faculty, and institutions well.

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## Autobiographical Sketch

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# Community College/High School Distance Learning Connection and Collaboration

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After three years of successfully providing college courses over a two-way compressed video system via T-1 lines using 1/4 T-1 capability, the Western Illinois Educational Consortium (WIEC) [consisting of: John Wood Community College, Carl Sandburg College, Spoon River College, Sauk Valley Community College, Highland Community College, Black Hawk College, Western Illinois University, a PBS Affiliate—CONVOCOM and the Quad City Graduate Center] in the Fall of 1996, applied for and received grant funds for $100,000 from the Illinois Board of Higher Education Higher Education Cooperation Act for a Pilot Project to connect the community college members of the consortium to highs schools in their respective areas for the delivery of high school and college level courses plus, where feasible, Internet services. The original grant was to fund two high schools from each of the 6 community college district to be desk top compressed video sites. Additionally, using funds provided by the Telecommunications Capital grant which originally set up the consortium, each consortium member could add originating sites at selected high schools.

Under the Telecommunications Capital Grant, John Wood Community College (JWCC) chose to add Quincy High School, located in the same city as the college, as an origination site. This choice was made prior to the Pilot Grant being submitted or funded. One of the reason for selecting Quincy High School as an origination site was to provide another DL (Distance Learning) classroom in Quincy for evening college courses. Currently, at JWCC there are two DL classrooms. One classroom is used to originate courses to branch campus sites in Pittsfield and Mt. Sterling—two towns located in the JWCC District about 40 miles each from the main campus in Quincy. The second classroom in Quincy is used to receive courses from other community colleges in the consortium and from Western Illinois University. Unfortunately, there are always too many courses available and not enough rooms to receive them thus the need for a site at Quincy High School. Another reason for selecting Quincy High School was it was the largest high school in the District and from a size point of view it was felt it would be in a good position to offer high school courses to the other high schools in the region.

The Pilot Grant funding for $100,000 was awarded in September 1996 but, the Telecommunications Capital Grant which was to provide the connecting technology was delayed. We waited until December. It was decided we could not wait any longer so we decided to begin the process of finding out which high schools were interested in being a part of the pilot Project. We set up a meeting with college personnel and representatives from each of the high schools—plus TECO representatives which serve the region. An overview of the WIEC System and the Pilot Grant Project was provided and a survey was passed out asking who wanted to be involved and what courses would they be interested in receiving and/or originating. Much to our surprise out of the 11 schools present 6 were interested in being origination sites and 2 were interested in being receive sites plus the Regional Office of Education was also interested in being a receive site. This created a dilemma as we only had funds to fund 2 receive sites.

At this point politically, we did not want to be the ones to decide who would be the two receive sites. We felt it would work better if through the process of deciding who would originate and receive courses there would be a natural paring down of interested sites. We decided to conduct further meetings to begin deliberations on what courses to share and when. We felt through this process the most likely candidates would emerge as the final two sites.

Unfortunately, time ran out and deadlines to order equipment required we choose the two schools. We selected Liberty and Camp Point High Schools. Liberty High School was chosen because the high school had a history of strong interest in being connected to us via telecommunications almost 8 years prior when we were investigating microwave technology as an option. Camp Point High School was chosen because it had a strong involvement in Internet technology and was a participant in a previous grant we managed dealing with providing Internet instruction and connectivity to high schools via an Illinois State Board of Education Grant. Another factor in the schools chosen was they were within the same TECO service provider's territory and that TECO (Adams Telephone Cooperative) had an interest in serving education at a reasonable cost.

We have also included Brown County High School (Mt. Sterling) and Pittsfield High School (Pittsfield) in the discussion as long as they were willing to bus students across town to our existing Branch Campus sites located in the same communities.

Our next meeting was held to determine what courses could be shared and at what times. We discovered our first major problem. Quincy High School (our proposed origination school) was on a different bell schedule from the two high schools chosen! In fact what we discovered is there are three different bell schedules within our district (8 Block, Modified 8 Block, and Traditional). Adding to the problem was the fact that the schools selected were not using the same start times in the morning!

After lengthy discussion and negotiations, we came up with three possible times and three possible courses. It was decided to survey students to see if they would be interested in taking the selected courses at the times elected. The times and courses chosen were 7:30–8:15 Basic Computing; 12:20–12:50 German I; and 2:30–3:15 Spanish II.

At our next meeting we discovered students were unwilling to give up their lunch hour or their afternoon hour for another class. The only class that seemed to work, given the incompatibility of bell schedules, would be the 7:30–8:15 Basic Computing class.

The next meeting will be to determine financial support for the instructor to receive training and work out issues related to the equipment needed to teach the Basic Computing course over the system.

Concurrent with this grant proposal we are seeking additional funds from other sources to upgrade all high school sites to origination sites and add more high schools. I believe this will help greatly as schools with similar schedules can share courses. At the same time as we were working with our high schools each of my fellow community colleges is doing the same. It is hoped that when all the high schools are on line and schedules are shared across the consortium that several courses will be shared. Several meetings have been held and more are scheduled to allow participating high schools to begin to share courses across the consortium.

The first course Basic Computing is scheduled for this Fall semester. By the time of the conference, I will be able to report any new developments. Between now and then our plan is to conduct instructor training, install the equipment in the high schools, and the designated high school instructor will have had time to develop the course.

### Some Concluding Remarks

I personally believe, there will evolve a new committee within the WIEC consortium which will consisting of high school representatives and a community college liaison person. This High School Support committee will deal with issues specific to the high schools and will report a proposed schedule to the Academic Support Committee which handles the scheduling of all courses across the whole system.

I suggest, for those community colleges who are planning to get involved in this type of project, establish a high school liaison position—either part time or full time. We requested this in the original grant but, it was cut. I have spent several hours away from my normal community college position attending meetings discussing issues unique to the high school environment. I did a lot of listening but, felt I was not much help as I was unfamiliar with their environment. Coordinating all the issues involved with high to high school course sharing requires attending several meetings along with a lot of individual conversations. I believe the results will be worth it but, you need to be prepared that someone at the college will be investing a lot of time.

### Autobiographical Sketch

**John Gebhardt** is the Director of Media Services and Telecommunications at John Wood Community College. He has presented several times at the International, Association for Educational Communications and Technology (AECT) conferences on subjects related to distance learning and visual presentation techniques. Has worked in the communication/education field for 25+ years: military (8 years), at a hospital, a 4 year college and two community colleges (combined total of 16 years). Has been involved in the development, facilitation and delivery of Distance Education for 9 years with a specific emphasis in two way compressed video for the past four years. Additionally, has taught EDU 151 Educational Media Course for Child Care Workers on the Distance Learning System for three semesters.

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# The Virtual Classroom as Authentic Experience: Collaborative, Problem-Based Learning in a WWW Environment

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This study examines the effectiveness of the electronic mediation of instruction to provide students with opportunities for interaction, collaboration, and authentic experiences that are equivalent to those provided by a traditional classroom format. The P254 project explored some of the potential of distributed learning via the internet, and in doing so implicated some important considerations for the future development of instruction in web-based environment.

## Background

In the Spring of 1997, the Counseling and Educational Psychology Department at Indiana University's Bloomington School of Education launched an experimental, web-based course in introductory educational psychology. This pilot project and study (P254-Introduction to Educational Psychology) materialized out of the collaborative efforts of the instructor, Jack Cummings, IU Professor of Education and Karen Hallett, Instructional Consultant for the IU School of Education, with the technical support of Kathryn Propst, University Computing Services.

P254-Introduction to Educational Psychology promotes the application of psychological concepts to school learning and teaching in the perspective of development from the beginning of preadolescence through adolescence, with special attention devoted to "special needs" students. This small experimental section began with an enrollment of 11 students, three of whom subsequently dropped the course during the semester. The students were all Bloomington campus students, but the course was conducted on-line.

This web-based section of P254 was designed to be conducted over the World Wide Web via Netscape 2.0, which is readily available in the IUB system. In addition, the developers of this course cooperated with University Computing Services to test pilot the course for the review of the commercial web-based conferencing software program, Allaire Forums. The course culminated in a problem-based collaborative assignment built around the web-based virtual school, Tigerlake Public School System, which was created and developed by Indiana University doctoral student Robert Fischler. Tigerlake consists of a set of student records for four grade levels, complete with student pictures, information about parents, grade history, achievement test scores, and other information about student behavior, socialization, and interests.

### Instructional Goals for the Course

P254 was developed around two instructional goals, *interaction* and *authenticity*—attributes which were considered crucial by the instructor and instructional designer for effective student learning. Adapting this course to a web-based environment required that special attention be given to designing activities and structures which fostered "classroom" communication and dialogue, and provided an appropriate "authentic" experience.

### Strategies to Promote Communication and Interaction

Unlike a conventional course with an emphasis on multiple choice and essay test based grading, students' grades were predicated on their participation in the intellectual dialogue created by the class. A more active form of engagement from the learner was sought by requiring the learners to draw on personal experiences they had in the teaching/learning process to make sense of the concepts discussed within the domain of educational psychology. Similar to the conventional survey course in educational psychology, the domains of learning, cognition, child/adolescent development, measurement, assessment, creativity, motivation, effective teaching, and constructivism were addressed. Students also debated issues in special education and multicultural education.

The assignments for the course were broken into two categories; weekly projects and web link submissions. Weekly projects were designed to require the student to spend a comparable amount of time as would have been devoted in a conventional class. In place of attending lectures the student was expected to explore the web and bring the results to the class by posting items in specified forums. There were seven weekly assignments and three biweekly assignments. For the biweekly assignments students were expected to post assignments three or more times over the course of a two week period.

Since one of the goals of the course was to investigate web-based teaching and learning approaches, 20% of students' grades was based on their ability to locate and postinnovative web links that relate to assigned educational psychology topics. Students posted the URLs they located in assigned threads within the Innovative Web Links Forum. They were expected to submit two URLs of web sites that they considered innovative and informative. Along with each URL submitted, students were required to write a three to four sentence summary of the web site. As soon as the students posted their URLs, the links were active and others could go into the forum/thread and use the link to visit the site. Every third week, students were required to visit the sites posted during the two previous weeks by their classmates and select sites that they thought were the most innovative and/or informative given the assigned topic of that week.

### Instructional Design of the Tigerlake Assignment

At the end of the semester, students were assigned a role playing exercise which utilized the student data records contained in the Tigerlake virtual school. Students were also pointed to a set of hypertext links situated on the Indiana Department of Education web site, which listed ISTEP+ (Indiana Statewide Testing of Educational Progress) Achievement Standards for Fall 1996, procedures for prior distribution of ISTEP+ content, the ISTEP+ Information Packet, Indiana Education Policy Center news and notes, and Indiana State ISTEP scores by school corporation and building. Two groups of four students each worked as a teacher team whose task was to collaboratively evaluate a student's progress based on school performance, classroom behavior, a class sociogram, guidance counselor's comments, and ISTEP scores, and to communicate those results and recommendations for remediation/ enrichment, etc. to parents. Student teams collaborated via Allaire Forums and email. The assigned collaborative task took the form of a parent-teacher conference. Dr. Cummings played the role of each student's parents, posing questions to the students that would likely come from parents in a real-life situation. These prompts compelled students to flesh out and/or refine their team members' descriptive assessments of student progress and abilities, and to justify suggested courses of action.

The design of the "authentic" problem-based assignment posed by Tigerlake Public School System was consistent with problem-based instructional tasks common to many professional training programs. The Tigerlake assignment was constructed to anchor learning activities to a larger problem, present a situation consistent with that which students are likely to face in future professional situations, and provide a context which was appropriately comprehensive and rich in detail.

## Results

Achieving interaction among the students in the course was an illusive goal in the design of the web-based undergraduate course in educational psychology. Prior to implementing the course, it was decided that a student-paced format would result in significant amounts of interaction between instructor and student, but less communication among class members. An indirect intent of promoting interaction among the students was to attempt to achieve a sense of community within the class. Toward this end, weekly dates were specified when their assignments were due.

There were two basic types of forums, public and private. Messages and assignments posted in public forums were able to be viewed by all class members, the instructor and guests. Class members and the instructor had read and write privileges, while guests could read but not write new messages. For each student in the class there was a private forum that could only be viewed by the instructor and only that student. The vast majority of assignments were conducted in public forums, however personal statements on special education inclusion and multicultural education were posted by each student in his or her private forum. Additionally the private forums were used to provide feedback on assignments.

By having the majority of assignments in public forums with the entire class posting at a given time, and with numerous prompts and encouragement from the instructor, it was hoped that interaction among students would occur naturally. This was not what took place. In the first six weeks of the class students reported doing what was required for the assignments, but not more. Posting additional comments and or reactions to others' postings was viewed as unnecessary because it did not count toward their grades. Students reported that when they posted a message, it felt as though it was lost in cyberspace. Unlike when speaking in class, they received no visual cues or reactions from their peers. Even the reactions from the instructor lacked immediacy.

To increase interactions among students, assignments in the last eight weeks of the class were redesigned to be more "recursive." Assignments were built on students' responses to previous assignments. Students essentially had to come back to what their peers had written for earlier assignments. For instance, students in their field work had observed public school classrooms and posted their reflections on the physical environments, diversity, and behaviors of children with special needs in those classrooms. A subsequent assignment required them to review the observations and then to use the research presented in one of the chapters of the textbook to make suggestions to improve the practices used in the classroom. Their role was to provide innovative and thoughtful ideas for the teacher. A third pass through the thread was required when the students took turns 'wrapping' or summarizing the points made in a given thread.

Students were asked to give feedback about the usability of the Tigerlake system, its relevance to other course content, its realism, and any other comments they may have had about the system and/or its components. Generally, student response to the Tigerlake assignment was positive. Most reported that the system was fairly user-friendly, and that it had been useful in applying course content to the specific tasks that the students were given. Two negative themes, however, emerged from the student evaluations. First, students wanted to see more complete information on each student, and were particularly frustrated by "missing" data. The general consensus was that students would like to see Tigerlake expanded and competed. Additionally, speaking to the perceived authenticity of Tigerlake, two of the students' comments registered concern over the appropriateness and accessibility of personal information contained in the student records.

## Implications for Future Web-Based Course Development

### Interaction

The course should actively encourage student-to-student and student-to-instructor interaction. Important components of instructional design that promotes interaction are:

- **Collaboration:** The instructional design should provide opportunities for student collaboration.

- **Recursivity:** The instructional tasks should allow students to revisit conversations and discussions.

- **Support:** Students should have access to the instructor for timely assistance, feedback, and guidance.

### Authenticity

The instructional task should be consistent with what will be demanded of the students in a professional situation. Important attributes of instructional modules that are meant to provide authentic experiences are:

- **Relevance:** The course assignments should require students to link the theoretical aspects of the course to professional practices.

- **Complexity:** The instructional problem/task should reflect the complexity, contradictions, and ambiguities of a real-world situation.

- **Completeness:** The instructional module

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## Autobiographical Sketches

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# The Meaning of Policy for Distance Delivery in Higher Education

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## Introduction

The availability of communications and computer technology has expanded dramatically throughout the world since the 1950s and currently offers unlimited potential for institutions of higher education to deliver credit and noncredit instruction and information to any part of the world (Naisbitt, 1984). Yet, the delivery of postsecondary education via telecommunications technology is extremely limited in the United States and is more common in cooperative extension work and professional training for adult learners (Baird & Monson, 1992). One factor limiting the actual use of telecommunications for delivery of postsecondary education is the existence of policies that may discourage colleges and universities from using these technologies. For public institutions of higher education, which are bound by rules and regulations for delivery of postsecondary educational courses, a lag between the availability of technology and its appropriate use is accentuated by state policies that either promote or inhibit deployment (Eure, Goldstein, Gray & Solomon, 1993).

Verduin and Clark (1991) speculate that this anomaly exists because of "American educators' lack of awareness about just what distance education is, how it operates, and what it can do for adult learning" (p. xi). Fullan and Stiegelbauer (1991) would attribute the time lag between the availability of emerging technologies and their application to the needs in higher education to the complexity of the change process. They contend that "educational change is technically simple and socially complex" (p. 65). To better understand this complexity, they posit several assumptions about change; among them are the assumptions that change will take time and "that any significant innovation, if it is to result in change, requires individual implementers to work out their own meaning" (p. 106). In higher education, that meaning is often defined through policy.

## Purpose and Methodology

The purpose of this study was (1) to describe the distance education policies and regulations now in place at the state level throughout the United States and (2) to describe perspectives of educational leadership of coordinating boards regarding the meaning of these policies to telecommunications-related issues and opportunities facing postsecondary education. The study was conducted in the form of a mail questionnaire sent to representatives of state higher education coordinating bodies in each state as well as the District of Columbia in January 1995.

Additional information was requested from respondents in the form of existing documents which could illuminate their individual responses. Respondents represent 96.07 percent of the population. More than half of the respondents also forwarded copies of official state policy guidelines, regulations, and other documentation associated with the use of telecommunications for distance education.

## Respondents

Responses from 48 states plus the District of Columbia were received. The 49 respondents provided 46 completed questionnaires and one completed telephone interview; two of the respondents returned blank questionnaires. After 40 responses had been received, the 11 nonrespondents were contacted by telephone. Ultimately, the telephone follow-up effort resulted in an overall response rate of 96.07 percent.

Twenty-seven respondents forwarded copies of state policy, guidelines, and/or other relevant documentation. Thirty separate documents containing *official* state policy and/or regulations were provided by 19 of these respondents. Twenty-three additional documents included coordinating board annual reports, reports and recommendations from special task groups and committees, SHEEO statements, state planning documents, electronic classroom specifications, and maps.

## Presentation of Data

Data from the questionnaire are grouped from the Fullan and Stiegelbauer (1991) perspective: (1) sources of innovation, (2) the meaning of change, and (3) factors affecting implementation and continuation.

### Sources of Innovation

Telecommunications technology is currently used to deliver postsecondary education in 46 states (100% of those responding to the fourth item on the questionnaire). It is important to know the source of distance education policies as well as where responsibility rests for coordination and implementation of established policy. There were 46 responses to the question: "Does the coordinating board for public institutions of higher education in your state have authority and responsibility for developing, implementing, and coordinating policies which impact the use of telecommunications for delivering postsecondary education?" Precisely half of the respondents checked the "yes" response; 16 (34.78%) reported responsibility is shared with another office or agency; five indicated such responsibility rests entirely with another entity in the state's governmental structure; and one respondent reported that no office or agency has such responsibility or authority.

In response to "Does your state have policies designed specifically to govern the use of telecommunications for distance learning?" half answered in the affirmative and half indicated their respective states have no such policies. Nineteen respondents included some documentation associated with or in support of their responses to this question.

### The Meaning of Change

One element of the questionnaire design was to have respondents describe the *meaning* of policies designed to govern the use of telecommunications for delivery of postsecondary education. Participants were asked to report both advantages and disadvantages of using the technology for this purpose, which of these are addressed by existing policy, and what needs and/or opportunities remain for policy to deal with.

**Advantages.** Respondents reported the major advantages of using telecommunications for distance learning as well as which of these advantages have been either enhanced, restricted, or overlooked by established state policies or procedural guidelines. The most frequently cited advantages were access, resource sharing, cost effectiveness, enhanced quality, expansion of service area, reduced travel, and convenience.

Other advantages (cited by only one to three respondents each) include improved faculty-to-student and student-to-student communication, increased variety of offerings, reduced number of sections, use of telecommunications may lead to faculty's use of other media, useful for post-graduate instruction, avoiding duplication, sustaining rural education and health delivery, and the ability to get programs from out-of-state.

**Disadvantages.** Respondents were asked to report major disadvantages of using telecommunications for distance learning. Associated costs were cited by slightly over 57 percent of respondents. Other disadvantages cited were the loss of a personal collegiate experience, lack of faculty preparedness, quality control, reduced access to libraries and other on-campus resources, difficulty of coordination, and turf issues. Disadvantages mentioned only once or twice among all responses include the need for students and faculty to possess a higher level of technical expertise, unrealistic expectations of the technology, political opposition from faculty bargaining units, difficulty in continuity for earning a degree, inequitable resource distribution, not all subjects can be adapted to the technology.

Respondents were asked which of these disadvantages have been addressed by established state policies or procedural guidelines. They were evenly split on their perception of effectiveness of policies put in place to address specific issues. Twelve of the respondents said policies adequately respond to the issues they are intended to address; an equal number said policies do not adequately respond to the issues; one respondent said "yes and no" and another indicated it is "too early to tell."

Ten respondents elaborated on these responses, adding that policies are effective "at this point in time;" that existing policies do allow for expansion and change; existing policies are adequate, but dated; and that the use of telecommunications technology is a dynamic process requiring "time, energy, and goodwill."

**Needs.** Respondents were asked about important issues, opportunities, and/or shortcomings which have not yet been addressed by state policies. Most frequently cited were resource sharing (including multi-state sharing), funding, planning, and absence of appropriate infrastructure.

Although cited less frequently, usually by only one or two respondents, several other factors were identified as issues or opportunities which still need to be addressed by state policy: equitable access for all areas of the state; competition; special educational tariffs to facilitate use of the technology; intellectual property rights; faculty workload, compensation, and related incentives; use of computers and multi-media systems; equipment protocol/compatibility among institutions; procedures for addressing support issues; institutional role assignments; student services; course/program development; integration of technology across sectors of government; K–12, college and other institutional coordination; and development of public/private partnerships.

When asked if activities were currently underway to address these issues, 38 individuals responded. Of these, the majority (84.21%) answered in the affirmative. When comments were added to elaborate on the response, 26 of the respondents (68.42%) mentioned that a special task force, the coordinating board, or some other entity was currently engaged in assessment and planning activities associated with telecommunications and/or distance education.

### Factors Affecting Implementation

The perception that established policy has genuine meaning and the apparent confidence in the planning process for directing future change are two factors which have potential for positively affecting implementation and continuation of telecommunications applications for delivery of postsecondary education. Other important factors include consortial agreements, emerging computer and communications technologies, and *system* development.

**Consortial agreements.** Respondent's were asked if their states had reciprocal, cooperative, and/or consortial agreements with other states regarding common regulations, standards, and criteria. Only seven of 43 respondents (16.28%) answered in the affirmative, and only one of these included a copy of the agreement with the response. Thirty (75%) of the respondents reported "no." Four individuals (9.30%) reported some effort is currently underway to develop such agreements.

**Emerging technologies.** Forty-two individuals responded to the question: "In your opinion, what impact will technologies which do not allow for immediate interaction between teacher and learner (such as CD-ROM and servers on the internet) have on delivery of postsecondary education?" Fifteen of the respondents (35.71%) indicated a belief that these technologies would increase in use, impact, and importance. Expanded access was mentioned as a perceived impact by 8 respondents (19.05%); precisely the same number declared there would be minimal impact or no difference in impact from that experienced with other technologies.

When asked if unique policies would be needed to govern the use of these technologies for delivery of postsecondary instruction, 11 of 38 responses (28.95%) were "yes" while eight (21.05%) offered a negative response. Five individuals (13.16%) indicated they did not know and five recorded "possibly," "perhaps," or "probably."

**System development.** In response to: "Does your state plan to develop a new system or improve an existing system for delivery of postsecondary education via telecommunications?" 36 of 44 respondents (81.82%) checked the "yes" response; 4 checked "no," and three indicated the potential is under consideration.

When asked about the major issues and/or concerns which have most contributed to a lack of or limited participation in distance education to date, 31 of 46 respondents (67.39%) cited *cost* or *funding*. Six (13.04%) of those responding to this question expressed the opinion that their states are "active" or already perceived to be leaders in the application of telecommunications technology for distance education.

### Factors Addressed in Existing Postsecondary Education Policy

Factors most often addressed in the *official policy* or *regulatory* statements provided by respondents are: quality control; access to faculty, libraries, and support services; statewide access to systems; processes for conflict resolution; funding, tuition, fees, and shared costs; monitoring and assessing student performance; advisement of and communication with students; faculty qualifications, appointments, and evaluations; and clearly defined priorities for access. Five of the official documents in the sample made no clear reference to the use of telecommunications for delivery of postsecondary education. Precisely one-third of the policy statements (9 of 27) included definitions relevant to policies intended to coordinate the use of telecommunications for delivery of postsecondary education.

### Process in Policy

Five of 27 policy documents (18.5%) encouraged needs assessment as part of the planning process, increased interinstitutional cooperation, expanded degree-completion opportunities for place-bound students, and/or evaluation of educational materials used for distance learning efforts.

### Institutional Issues

Factors cited in official policy from three different states were admission requirements and specific approval procedures for courses, programs, and activities associated with distance learning at the institutional level.

Other factors addressed less frequently by postsecondary distance education policy in the 18 states include interinstitutional cooperation, faculty concerns, and student-oriented issues. Those most closely associated with the coordinating role include technical capacity, day-to-day management of the system, out-of-state access, distinctions between originating and sponsoring schools, improved coordination, and avoidance of duplication. Issues of interinstitutional cooperation include agreement on technical standards, transfer of credit, transcript responsibility, third party requests for credit, contracts for delivering instruction, and whether a physical presence in the state is required. Student oriented issues include provisions for student complaints and grievances, waiving the rules, exemptions for continuing education and other non-credit extension efforts. Faculty concerns cited in the documents include compensation, faculty development, copyright, and intellectual property rights.

## Conclusions

Analysis suggests that coordinating boards are outcome-oriented and that states are both planning- and policy-ready to deal with issues associated with telecommunications applications in higher education. Based on the collected data, and taking the scope and limitations of the study into account, it is concluded that: (1) the leadership of state higher education coordinating boards is aware of and keenly interested in expanding the use of telecommunications technology for delivery of postsecondary education; (2) states are planning- and policy-ready to deal with issues associated with telecommunications applications in higher education; (3) states have already made investments in telecommunications technology for distance education applications and plan to invest further in the improvement of systems; and (4) coordinating boards are outcome-oriented and strive for shared meaning in educational change.

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## Autobiographical Sketch

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# Effects of Computer-Based Interaction on Learners in a Virtual Classroom

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## Introduction: The Problem

One of the primary concerns with distance learning today is the degree of isolation felt by students who are engaged in the distance learning process. What is needed is a means for increasing the amount of student involvement and interest. At a remote site, involvement is the amount of participation and inclusion students experience (Do they feel they are part of the teaching/learning environment?). Student interest is defined as the appeal, attention and enthusiasm students have for how and what they are learning. It is possible that today's computer technology may hold the solution to this thorny problem.

Interactive multimedia and knowledge-based systems offer great promise for conducting education at a distance. This technology can have a positive effect on students who are learning at a distance by increasing student involvement and maintaining interest. The technology also fits in nicely with collaborative learning and group problem solving. This combination of interactive, involving technologies contributes to eliminating a feeling of isolation and increases student problem solving abilities.

Distance learning can be delivered through the use of computers and CD-ROMs, the Internet, Intranets, interactive TV, teleconferencing, telecourses, televised instruction and other technologies. The selection of the proper combination of these technologies greatly enhances the potential for effectively providing an instructional delivery system in which all students are involved and interested. Single mode delivery systems do not provide enough instructional power to ignite the student's interest because they lack the immediate dialogue that can occur in a classroom, and many of the single delivery modes fail to provide student involvement. Student involvement aids student achievement (Berger, 1991; Kay, 1991; Hirschbuhl, 1992).

## Project/Product Description

Over the past four years, the University of Akron has been engaged in the development of interactive multimedia projects for distance learning applications. One of the products, Environmental Science: Field Laboratory has been tested and published as a CD-ROM title. The series provides multimedia simulations based on actual field studies. In each program module, the student takes the role of an investigator. Each module presents a different environmental problem which students investigate by using the tools of an environmental scientist. During each investigation, the students collect and evaluate real environmental data and write summary research reports. The students choose data collection sites, collect samples using computer simulated instruments, conduct searches for data recorded from previous studies, and keep a modeling book of their findings. These hands-on field experiments are made possible through the use of audio, photographs, video, animation, maps, charts, and text. In addition, students use on-line messaging to ask questions, challenge the computer's analysis of their study, or send their reports to the instructor.

While students are allowed to structure their own investigation using any of the tools available, guidance is accessible at every point in the program. The program evaluates each student's methods and conclusions, and provides a post-test. All students write a final report of their investigation's findings. The program keeps records for each student, including their performance (sampling and conclusions), post-test scores and final essay scores.

## Program Content

The program's topics presently include:

- Introduction to Environmental Science
- Geology of Home Site Selection
- Radiation in the Environment
- Streams and Floods
- Minerals for Society
- Energy From Coal
- Stream Pollution

## The Research Setting

During the 1994--96, academic years student success in an interactive multimedia course was studied by Dave Masarro (1995) and Valerie Frear (1997). Differences in teaching, learning, analytic skills, and attitudes toward science and technology that could be attributed to the interactive multimedia program were evaluated. Over 550 non-science majors at The University of Akron were involved in the research. Frear's study ($n = 152$) was composed of 113 in the control group and 39 in the experimental group. The traditional lecture method was used with the control group while the experimental group experienced a computer based interactive multimedia distance learning in a synchronous and asynchronous mode. The computer based group interacted with eight problem solving modules in Environmental Science.

## Research Design

In Frear's (1997) study, a quasi-experimental design (Campbell & Stanley, 1963) was used because it combined the use of intact groups, pre-test and post-test and the use of a control group. Massaro (1995) used a pre-test and control group. Masarro and Frear tested a total of eighteen different hypotheses, dealing with predicting student performance, checking student attitude, and testing the effectiveness of interactive multimedia instruction.

## Method

In both studies, students either received the traditional lecture method of instruction throughout the course, or the interactive multimedia modules replaced part of the course. Massaro's students interacted with four modules, whereas Frear's group used eight. In both studies pre-tests were administered before the experimental groups engaged in the multimedia simulations. Frear's study also included post-tests. The GALT (Group Assessment of Logical Thinking; Roadrangka, Yeany & Padilla, 1982) was used as a pre-test instrument in both studies and in Frear's study it was also a post-test instrument, along with a pre-test and post-test of science and computer attitudes.

## Results of the Study

In both studies there was a significantly greater percentage of students who used the interactive multimedia modules and received a passing grade (B or better), than those students that only received the traditional lecture method of instruction. In Frear's study 74% of the experimental group received a grade of B or better; and 27% of the control group received a grade of B or better. The GALT was found to be a good predictor of those students who would pass the course. Massaro (1995) used an alpha level of 0.01 whereas Frear (1997) used 0.05. Frear found non-traditional students did significantly better than traditional students but in Massaro's study no difference was found. Massaro found those students taking algebra II or higher mathematics in high school did better than those who did not. No such significance was found in Frear's research. None of the remaining hypotheses showed significance in either study.

One of the purposes of the course was to develop problem solving abilities without heavy use of mathematical exercises. The best predictor of student success in Frear's (1997) findings was GALT scores indicating a cognitive level of development equal to transitional level or higher (score of 11 or higher). The post test GALT scores were significantly higher for those experiencing the interactive multimedia treatment. The treatment seems to help students raise their analytic ability and hence increases their problem solving ability.

Comments made on evaluation instruments indicated the technology increased student awareness of proper environmental management. In addition, students said they felt comfortable using the program. Students reported feeling a sense of responsibility and control over what they were learning. Students said they enjoyed using the field simulation modules because:

- They were in control of when they worked and the pace of their lab work.
- The self-initiated one-on-one interactions with the program were helpful.
- The problem solving method of instruction held their interest.
- They immediately knew the results of their efforts.

## Implications and Findings

Students who used the simulated field studies felt they took an active part in learning by means of navigating, accessing and manipulating the data through the program. They all indicated they had high interest in what they were learning because of the way they were able to access and manipulate the data.

In short, the study indicates the students feel highly motivated because they were actively engaged in learning the material through an interactive multimedia environment which permitted them to access a variety of resources on an on-demand basis at their own pace. (Lawson 1991).

## Recommendations

### Faculty Development

Faculty should receive adequate training in the development and use of interactive multimedia instructional programs before engaging in staff supported instructional development.

- Identify an instructional problem.
- Determine terminal and supporting objectives which lead to the solution of an instructional problem.
- Select the appropriate medium to fit the instructional requirements of each instructional objective.
- Work with instructional designers and developers.
- Increase one's knowledge of the proper utilization of interactive technologies when teaching at a distance.

### Expand Faculty Reach

Too many of our students today cannot be present in the classroom when instruction is being delivered. Therefore, instruction must become accessible from a distance asynchronously. We can no longer be constrained by walls, times or by the faculty's location. We must be able to provide sound, interesting, interactive instruction to students where and when they are able to use it (Kearsley, 1993; Skolnick, 1993).

### Improve the Instructional Design

The basic problem with current distance learning delivery systems is they are often designed for students in a classroom and ignore the needs of the distance student-flexibility, interest and involvement. Part of the problem stems from faculty having only themselves and an occasional graduate student to rely on for design, creativity and expertise. Today's well designed instruction incorporates the work of several skilled people, such as instructional designers, educational technologists (developers), and quality assurance specialists (Arnheim, 1991).

### Use Current Technologies

We live in an age of diminishing astonishment and rising expectations. If we expect to be successful in this fast changing information age we must ride the back of today's technology tigers. Technology advances such as phone mail systems, the Internet, Intranets, bulletin boards, teleconferencing systems and interactive networked multimedia systems provide an effective means for facilitating faculty-student communication and involvement. Today's technologies provide an electronic pipeline to reach students at a distance with an instructional delivery system that will involve and interest students who are using it. (Van Horn, 1991).

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## Autobiographical Sketches

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# Interactive Strategies for Collaborative Learning

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## Purpose

Assigning students to work in groups has long been an accepted practice to achieve collaborative learning. This paper provides a conceptual framework for a session on interaction strategies. Thoughtful instructional design can make the use of groups effective for distance learning too.

## Introduction

There has been a great deal of discussion about the changing role of the teacher in distance education. We can no longer solely be "tellers" of information; the hour-long lectures we once thought were so successful in our traditional classrooms do not necessarily translate well to a distance learning environment. We are encouraged to make our distance classes more interactive, to plan for more student involvement. How does this affect learning? Smith (1982) observes that learning may be described in many ways: as a process, as a product, and as a function. While learning is a personal and natural process, it is also a socializing process. It involves change and is bound up in developmental stages of human growth. Learning can be intuitive and insightful; it is also experiential and involves interacting with one's environment. Learners can be both independent for self-directed learning and interdependent for collaborative learning. "*Education* then can be defined as the organized, systematic effort to foster learning, to establish the conditions, and to provide the activities through which learning can occur" (p. 37). A cognitive/constructivist approach holds an ideal of an interdependent teacher and learner, a student who assumes responsibility for constructing meaning within a learning community. Garrison (1996) defines education as "essentially a social learning experience" and describes an emerging paradigm in which students assume responsibility for constructing meaning in a collaborative or interactive setting. The emphasis is on "interpersonal and small group communication" (p. 17). How should we organize and provide activities for the distance environment?

Keegan (1996) asserts that what is missing in much distance education is the "linkage of learning materials to students' learning." A proposed remedy is the "reintegration of the teaching acts by which two-way communication between the distance learners and the distance teachers can be reconstructed and in which learning can occur" (p. 131). In practical terms, it reinforces the necessity of interaction.

## Planning for Interaction

Many educators have adopted the notion that there are primarily four types of student/learner interaction involved in distance education: learner-content, learner-teacher, learner-learner (Moore, 1989), and learner-interface (Hillman, D. et al, 1994) Of these, learner-to-learner interaction is fundamental to collaborative learning. It is the small group that provides the forum or environment for this potentially powerful kind of learning. The design, development, and the successful implementation of small group teaching/learning require a measure of student training in addition to teacher training. Students' learning will be enhanced as they develop an awareness of themselves as learners and acquire new ways of perceiving and interacting with their environment. Additionally, successful distance educators should be well grounded in group dynamics when planning learning activities.

There are always two aspects of small group activity which occur simultaneously during an activity or event: one involves the subject matter—the content; and the other involves the dynamics among group members—the process. These ingredients are present in all interactions. Content is the focus of the group's attention, the task that occupies them. Process is related to such things as leadership, atmosphere, feelings, attitudes, morale, competition, cooperation, influence, participation, conflict, commitment, and so on. Process is often the major cause of ineffective group action; unfortunately, either very little attention is devoted to it, or it is not well understood by instructors or students, or both.

## Small Group Instruction

Do we know what really happens in those groups? Actually a great deal is going on, and only a part of it has to do with subject matter, or content. To be sure, problems are solved, decisions are made, attitudes are developed, "consensus" is reached, etc. But students/learners are also forming opinions about each other, developing perceptions, reacting to other members, creating conflict, competing, arguing, ignoring, withdrawing, giving feedback, etc., all at the same time. There is opportunity for learning at many levels and about many things.

### Stages of Group Development

As part of the process, all groups seem to change, develop, and experience characteristic stages: forming, storming, norming, performing, and adjourning (Forsyth, 1990). This predictable process occurs in much the same way that individuals experience growth from infancy through childhood, adolescence, adulthood, to old age. These periods include a getting-acquainted process during which members try to get to know each other. This is followed by a period characterized by differences of opinion and possible struggles for position—*competition.* During this stage the group must develop means of conflict resolution or resolving conflict in order to develop norms of acceptable behavior. Internal dynamics develop as cohesion increases since group members more readily accept group goals, decisions, and norms. Therefore, one might expect more group stability, more effective communication, increased group influence, greater satisfaction and positive personal consequences for members—*connection.* Finally, given the right set of circumstances and mix of participants, the group will ideally move to a higher level of performance and achievement. Typically greater productivity usually occurs after the group has reached a level of maturity—*collaboration.*

A measure of time and effort is required for all of this happen. It should be noted that many groups never reach this mature level of functioning. However, all groups must go through all levels or stages of development in order to get there. There can be no shortcuts; stages may not be skipped, nor may the order or sequence be changed. Groups may also find that any change in the dynamic or influence may affect or change a given level or stage. For example, if a new member joins the group, the group will most likely revert to an earlier stage.

### Facilitating Small-Group Learning

According to James W. Botkin (in Smith, 1982), "Probably no greater need exists than to learn how to participate effectively. Many studies have shown that humans are, and always have been, social animals" (p. 106 ). Participation is central to collaborative learning. The dynamics of any group are directly related to the ways in which members participate or choose not to participate. "Collaborative learning assumes that knowledge is a consensus among the members of a community of knowledgeable peers—something people construct by talking together and reaching agreement" (Bruffee, 1993, p. 3). Collaborative learning is the process by which learners move into the new knowledge communities, develop fluency in the language used, and learn the craft of interdependence as it applies to a learning environment. A wide variety of group learning activities may be included; however, the following elements of small-group instruction are necessary to achieve positive results (Cooper, Robinson, & McKinney, 1994, p. 75–76):

- Positive interdependence among group members
- Individual accountability for evaluation/in grading
- Appropriate assignment to groups
- Teacher as coach or facilitator
- Explicit attention to social skills
- Face-to-face problem solving

In a common model of collaborative learning, teachers do four things (Brufee, 1993, p. 28):

- They divide a large group—the class—into smaller groups.
- They provide a task, usually designed (and preferably tested) ahead of time for the small groups to work on.
- They reconvene the larger group into plenary session to hear reports from the small groups and negotiate agreement among the group as a whole.
- They evaluate the quality of student work, first as referee, then as judge.

### Types of Thinking

Instructors must also consider the purpose for the group. Small group learning methods are usually more effective for promoting problem-solving skills and changing attitudes. They promote judgment, diagnosis, discussion skills, clarifying. and higher order thinking as well as improved writing skills (Bruffee, 1993). The main types of thinking across many subjects that may be developed by small group methods are as follows (Brown & Atkins, 1990, p. 57):

- Analyzing
- Logical reasoning
- Evaluating evidence or data
- Appraising and judging perceptively
- Thinking critically
- Seeing new relationships
- Synthesizing
- Speculating creatively
- Designing
- Arguing rationally
- Transferring skills to new contexts
- Problem-solving

### Other Considerations

There is a great deal of research that supports the efficacy of group learning, but the outcomes or results of these activities may vary. There are times when some groups may "do well" and others do not. (Moore 1994). Instructors may never be entirely sure what causes the discrepancies. Obviously there are many things we need to be thinking about in addition to the stages of group development: degree of heterogeneity, group size, gender, ethnic background, social maturity, length of group assignment, quality of group decisions made, control issues, purpose, and so forth. Teachers may have to help students understand what they are experiencing in the group and devote some time to facilitating process. Perhaps groups would benefit by initial team building activities. It may be necessary to reassign group members or change the size or makeup of the groups. Studies indicate that the best group size for complex issues is five or six students, and that heterogeneous groups are more effective at group decision making. Long term working groups seem to be most successful with three members. (Brown & Atkins, 1990; Bruffee, 1993).

### Alternatives

This is not to say that everything must be done in groups. Instructors can overdo it, becoming very predictable and even gratuitous in their use of group activities. "We don't need to collaborate to turn out the lights" (Schrage, 1995, p. 229). Other types of interaction may better fit the learning situation. Or when learner-to-learner interaction *is* desirable, the use of dyads can be very efficient and effective in quickly getting a class involved in content while at the same time initiating some rapport and foundational team building (Eitington, 1989; Silberman, 1996).

### Summary

Instructors must be prepared to design and facilitate the most effective learning experiences possible. A collaborative learning environment may provide students the opportunity in which to maximize their learning experiences; however, many factors inherent in group process impact the actual outcome or learning realized. Successful collaborative learning does not automatically commence with the signal, "Now let's break into groups."

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## Autobiographical Sketch

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# Lotus Notes Based Distance Education at the IBM Watson Research Center

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## Abstract

We describe a distance education solution based on Lotus Notes that is used at IBM's T.J. Watson Research Center. The presentation of educational information involves the use of "cards" based on an underlying information presentation approach of minimalism. This paper describes the origins of our solution, the structure of our courses and cards, and our promotional methods to direct employees to our solution. Analysis of data on card usage provide evidence that our approach is effective at providing education on demand, that information is readily transferable to the work environment, and that by using the currently existing technical infrastructure we can support the educational needs of both local and global users. We conclude with a description of our future directions.

Adequate training and education of employees in a rapidly changing technology-intensive environment such as IBM's T.J. Watson Research Center is critical for success. The Watson Research Center has used a combination of vendor supplied, on-site face-to-face classes and Computer Based Training (CBT) software to meet our educational needs. Over time these traditional education sources have become increasingly expensive and inadequate in fully meeting the needs of the Research community. Therefore, we developed the distance education solution described here.

Face-to-face, instructor led classes can have several drawbacks. Excellent instructors and courses are few and expensive. Students' time in class can be costly in terms of lost productivity. On site classrooms are expensive, and off-site classes involve travel time and expenses. While the instructor can adjust the level of a given course while teaching, there can be high individual differences among students due a mix of abilities and backgrounds. Expecting all students to proceed at the same group pace leaves some students bored and others overwhelmed. Because the classroom environment, materials and examples are often different from the student's office environment, it can make it difficult for a student to apply what is learned.

CBT courses have their own set of limitations. Courses are static and in rapidly changing fields quickly become outdated. They are updated at infrequent intervals, and learning about the differences can be costly for students in terms of time and money. CBT courses have a limited facility for allowing students to select only what they need to learn, and preconceived paths through the material allow only limited deviations. It is assumed that students will always follow the material in the prescribed order and thus not make mistakes. Feedback and error recovery is therefore mostly non-existent. There is limited ability to use the software for subsequent reference material due to limited search facilities, and the fact that they're usually not installed and running in the day-to-day environment.

Some network based courses are just CBT courses that can be downloaded from a network. True network based courses require a constant network connection, with its concomitant limitations of mobility and connection expenses. Extensive use of multi-media requires high bandwidth and high performance servers. These courses, as well as CBT based courses, take over the user's desktop, separating the educational environment from the daily work environment making it difficult for students to apply their newly learned knowledge. Better integration of the learning environment with the business environment would improve educational delivery and use of the material presented.

In the remainder of the paper, we discuss our implementation of a Lotus Notes based distance education solution at Watson, and present data indicating the effectiveness of our approach, and discuss future directions.

## Implementing a Distance Education Solution

Several years ago, in the AIX Unix environment, we developed an on-line virtual classroom delivery mechanism (Colet, Icken & Ungar, 1993; 1993) but it wasn't easily ported to OS/2 and Windows 95. IBM's acquisition of Lotus created the need to train Research employees in using Lotus Notes. We decided to port the asynchronous (not connected to an instructor) portion of our AIX virtual classroom to use Notes technology to provide the needed Notes training.

We chose not to use multimedia, and to rely on available workstations, servers, and network hardware and software resources in order to deliver our courses with little impact on our computing infrastructure or hardware and software budget. The courses are stored in Notes databases on an existing shared Notes server and can be accessed from any Notes client using a network connected OS/2, Windows 95, Network Computer, or AIX platform. Employees can make stand-alone copies of our courses for disconnected use. Thus our courses can be easily used while travelling, or from home with a Notes client. For course developers, our authoring system does not require any Notes programming skill. Courses are developed and updated iteratively and the latest changes are immediately available to all server connected employees.

We use a minimalist approach derived from John Carroll's (Carroll, 1990) research. The essence of the minimalist approach is to provide information in a way that is compatible with human learning strategies, and one that encourages people to actively and efficiently find and use just the information they need. Information is designed to be more hands-on and task-oriented, rather than conceptual. This is implemented as structured sets of "cards" on common tasks. Cards can be used in any order (each card is designed to be able to be used independently), or followed in sequence. Related tasks are grouped into modules and modules are grouped into courses. The courses are searchable so the cards can be used for just-in-time reference on a specific task as well as for learning a complete module or course. We have added some specialty cards such as a "Concept Card" when a new concept is essential for understanding later task cards.

Each module begins with three cards—a "Big Picture" card which gives an overview of the main concepts and tasks covered in that module. We follow that with a "What's New" card to list new and changed features in a new release of software, or changes in the computing environment. The third card in every module is a "Self Test" card which lists 5–10 challenging true/false questions and answers, so users can determine if they know enough about the module, or if they had learned the material after having gone through the module. Each course includes a special "Roadmaps" module which contains links to all the "Big Picture," "What's New," and "Self Test" cards for employees who want to review specialty cards.

Each course is structured hierarchically with three levels: Course title, section title, and card title. An example of a course title at Watson is "Notes Release 4 for IBMUS," with a section on "Adding files and links," and one of the cards in this section describes how to "Attach a PC file to a Notes Document." Each card has a carefully designed layout containing specific sections as illustrated in Table 1.

**Table 1. Sections of a Card and Their Purposes**

| Card Section | Purpose |
|---|---|
| Card Title | Description of a task that a student may want to do |
| Short Introduction | Optional section providing an overview of the task, why one may want to do it |
| Hints and Suggestions | Instructions on how to complete the task (based on principles of minimalism) |
| Checkpoint | What one should expect to see happen if the task was successfully completed |
| Error Recovery | Steps to take if the task was not successfully completed |
| For More Reading | Section pointing to related tasks, advanced techniques, shortcut methods, etc. |

The content for new concept, task cards, or additions to existing cards are determined from various sources such as: changes in our computing environment, reviews of help desk logs, feedback from consultants' office-visits, reviews of frequently asked questions, observations of students' questions and errors during classes and seminars, as well as the log files on the usage of cards.

The implementation of our distance-education solution involves promoting our educational approach to the Research community via the Intranet Web pages, and through the offer of seminars. For example, our advertising of the New Course Education Database reads:

> This course database is designed for "just in time learning" by employees new to the subject as well as experienced users of the old version of the software. Study what you want to learn when you need to learn it. Use the database to learn the material from our seminars or for reference on specific "how to" questions before calling the Help Desk. Too busy to study during the day? Copy our database to your ThinkPad or carry it home on a diskette.

We also offer short walk-in seminars that cover specific modules or combinations of modules in the online education database. Class instructors let employees access selected on-line cards during a seminar. Faster students with more background knowledge can "decouple" from the instructor to explore the rest of the cards on their own. The seminars covering the content in the education database described above are also advertised as follows:

> Want to learn more about the new software? Take a seminar about a specific topic of interest or stay for a half day or more. Start with the Overview seminar and take an additional seminar each week. No need to preregister. Please see the schedule for details. All seminars are in our classroom and provide the opportunity for hands on practice. Too busy to attend a seminar? All seminar materials are online in the education database. We also have a number of other education resources available.

For self-study, employees at their desks access the same on-line cards that are used in the seminars. Familiarity with the cards from use in class or seminars make it natural for employees to continue to use them for ongoing learning or to reference information. Other employees learn about the cards when a HelpDesk consultant answers a question by linking the response back to relevant cards. As word of our online courses spread, we've noted extensive access to the cards by employees at Watson and also by employees at various IBM sites around the world (who have never attended one of our walk in seminars). Our approach has become popular by word of mouth, by Intranet web pages, and by their usefulness. Recently, we've been asked to use our modular content for a "train the trainer" session so that a major IBM Hudson Valley site currently planning Notes education can evaluate the approach. Depending on the quality of the content we create, we fully expect our upcoming online courses on Windows 95 and Internet-Trends to also be successful. We sense that we've reached a critical mass of internal customers who prefer our delivery methodology and technology rather than day-long classes. The data analysis described in the next section provide support for this notion.

## Data Analysis, Results, and Discussion

The implementation described above allows for substantial data collection via the use of log files. Each record in the a file is a record of a particular card being accessed. In addition to the identity of the card, each record also contains the following information: date (when the card was accessed), time (the time the card was accessed), site information (where the user is logging in from), and user information (a way to identify a user). In some cases, the user identity and their site can not be determined, and these records are logged as "anonymous" users. Analysis of the log files allows us to improve the educational material. By knowing what cards people are frequently accessing, we can determine which topics they are currently having difficulties with. Analyzing usage patterns let us determine the extent that the underlying theoretical approach of Minimalism with it's assumptions about user behavior are supported.

In the analysis presented here, the summary statistics are based on those records in the data in which the end-user and their site are identifiable. We have also excluded those records that are based on usage of cards during classroom presentations led by an instructor. Our intent is to assess usage of cards by end-users in an asynchronous self-study manner. Specifically, we are interested in assessing (a) the extent that users are using the material outside of classroom settings, and (b) the extent that users are freely moving about the material, selecting only what they need at the time. Evidence for these two aspects provide support for the broader issues of providing learning-on-demand, supported from within a current technological infrastructure, with educational content that is easily integrated with our end-users' tasks in the business environment.

The data set is based on records between January 1, 1997 and May 29, 1997. Excluding those cases described above, there were 5446 records of cards accessed. There were 484 uniquely identifiable cards, 367 uniquely identifiable end-users, logging in from 14 different sites ranging from Almaden, California to Zurich, Switzerland. The Watson servers were literally providing access to these local and global users around the clock with peak periods around 10:30 am and 3:30 pm (EST) when approximately 500 cards are accessed in each of these peak periods.

With regard to the use of cards outside a classroom setting, the fact that there were over 5000 accesses from over 300 users (excluding cards accessed in class) in the current year alone, provides strong evidence for the use of educational material outside class. The distribution of access times by people from the Watson site show the same peaks as in the overall distribution (10:30 am, and 3:30 pm) suggesting that the cards are used by people at work in their offices since these peak periods occur within the hours of a normal work day. But the fact that times specific to Watson users also range from 6:00 am to after midnight also indicates use after work.

One of the claims of Minimalism is that people do not necessarily follow educational material in the order that it's presented. Instead, they will actively move around the material to find what's most relevant for them—despite the fact that material may be organized to have been used in a specified sequence. Although the cards have an implied order, they are designed to be used in any order.

The data support the fact that people self-select material and topics of interest to them. For a given session (cards accessed on a specific date by a person) a person will look at five or six cards ($M = 5.6$, $SD = 11.8$). The relatively high standard deviation reflects the fact that there are large individual differences among people—with several selecting only a single card, and others accessing numerous cards in a session. On average, people have between two to three sessions ($M = 2.57$, $SD = 2.54$). The number of cards accessed in a session, and the several sessions per person provides evidence for the notion that people are selecting cards to learn to about how to complete specific tasks—and the repeated visits to access the cards further indicates that they view the cards as a valuable resource to frequently rely upon for information.

There are several people that have looked at well above the average number of cards in a single session. It is likely that these people are not necessarily looking to complete a single specific task, but rather to learn about several tasks in a more comprehensive experience. Given the data, it is possible to examine the sequence of cards that a person looks at over the duration of a session to determine if they use the material in an ordered sequence, or if they freely move around selecting various cards. A user profile can be represented as a graph in which the x-axis is time, and the y-axis is the card-identifier. If a person goes through the cards in a strict order, spending exactly the same amount of time on a card, this plot would be a straight line with a positive slope.

Typical user profiles are not a straight lines with uniformly positive slopes, but instead they vary widely. Some indicate a generally sequential route through the cards, and others a highly variable one—moving from "early" cards to "late" cards and back (it may be possible to model these user profiles in terms of Markov models). These results provide more evidence of high individual differences among people, and that even when a person looks at numerous cards, it is likely that he/she will move around the material quite freely, self-selecting those tasks that they feel to be most relevant, rather than proceeding through the material in a strict sequential order.

The substantial amount of data on the use of cards, and the observations about how and when they are used, provide evidence for a demand on the part of users for accessible and useful educational material outside a classroom setting. In the current implementation, we've been able to successfully meet this demand while using currently existing technology and infrastructure. The current infrastructure has even been able to provide support for both local and global users outside Watson.

## Future Directions

There are four target audiences being addressed with our technology: students, content writers, instructors, and course owners. Future efforts and enhancements will address the needs of the content writers, instructors and course owners without sacrificing any of the features that we have built for the students. A new authoring environment makes it possible to create a stand-alone course where authors are at the same location, and/or to create a master course in which people from different sites can write cards specific to their location. The advantage is that this application can be designed to display site-specific cards at each location yet also be able to share and use the general cards. We will also have a web interface to the classroom content using Lotus Notes Domino Web Server.

Our education application consists of two parts today—content and logging. We have not added any multimedia to content because our focus has been on providing core information. Yet our technology is flexible enough to allow a content writer to easily add multimedia components inside the Content database. It is also flexible enough to just use the Content database to deliver course materials and turn off the logging function.

A new part will be an Administration component, which will support the synchronous (an instructor available) version. The synchronous classroom will require a Java enabled web browser. It will allow instructors to add new courses, and schedule existing courses. Students will be able to register for this virtual class (remote online access) from the web. A Java chat application will provide the mechanism for communication between the instructor and other students.

A typical scenario would proceed as follows: At a scheduled time, the student would go to a URL for Content, login to access the Java chat application, and join the live class. The instructor would login to start the chat program and go to the URL for the Log information to observe and track the students' use of course content. When a student asks a question, the instructor would know where that person is. The instructor may also have Lotus Notes running to make immediate changes to the course materials based on the student feedback during the class.

The synchronous classroom can be setup to run from the web or Lotus Notes 4.5, but our efforts are focused on the web because experience has shown that people are more familiar with using a web browser client than using a Lotus Notes client. As before, students can use the course content in any order that they wish, and have access to full text search. Whether the course becomes either a synchronous class, an asynchronous class, or both, the content developers will still rely on the same application (Lotus Notes) from prototype to production of the course materials. This would reduce the amount of time necessary to create a course.

In conclusion, our implementation of a distance education solution has evolved out of necessity, and has effectively served the needs for a large community of employees. Our future efforts plan to extend the approach and to continue to be an effective and viable educational solution.

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## Autobiographical Sketches

**Don Icken,** Project Leader Distance Education: Watson Information Systems Department. Don graduated from the State University of New York with a degree in Computer Science, and has a Masters in Computer Science from Pace University. He joined IBM in 1977 and managed a $100M billing system, wrote operating system software for OS/2, and worked on the development of Watson's distributed UNIX environment. Prior to joining IBM he worked as a programmer for the NY State Dept. of Mental Hygiene. He is adjunct professor at Purchase College, NY, and teaches C++.

**Edward Colet,** Senior Analyst: Networked Data Systems Department. Ed was a part of the Watson Information System group before moving to Networked Data Systems Dept, where he is working on data mining and knowledge discovery (KDD). His most recent project was developing "Advanced Scout," data mining software for NBA coaches. He is also completing a PhD in Cognitive Science at New York University. His research interests include statistical analysis, quantitative modeling, data mining, and the human factors and usability of computer systems.

**Neal Keller,** Collaborative Computing Educator: Watson Information Systems Department. Neal graduated from Columbia University with an Industrial Engineering degree, and has a Masters from Queens College in School Psychology. He coordinates the computer education program at the IBM Watson Research Center and specializes in teaching Lotus Notes. His role on the distance education team is to author content, use the content in classroom teaching, and provide user feedback on our methodology and technology. Prior to joining

IBM in 1985 he held positions in industry as a value engineer and computer salesperson, and in public education as a math teacher and school psychologist.

**Lisa Ungar,** Webmaster and Notes Developer: Watson Information Systems Department. Lisa graduated from the State University of New York at Binghamton with a degree in Linguistics, and has a Masters in Computer Science from Polytechnic University, NY. She planned and delivered the initial Internet classroom education at Watson and currently divides her time between webmaster responsibilities and development work in Lotus Notes for our distance education team's authoring and delivery technologies.

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# Designing Interactivity Into Satellite Training

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Interactivity was an important factor in the success of the Prairie Public Broadcasting satellite training programs entitled "Let's Talk Business" and "Cyberbusiness." "Let's Talk Business" was a series of 13 live satellite training programs which had 10 to 15 sites across the state of North Dakota. The target audience was entrepreneurs, and the overall goal was to stimulate economic growth through the education of entrepreneurs on various aspects of starting and running a business. The audience was mixed between experienced and novice entrepreneurs. CyberBusiness was a two-part series of live satellite seminars for entrepreneurs to teach them how to more effectively utilize technology in their businesses.

What was learned during these satellite series can be placed into four primary categories:

1. Methodology of Teaching
2. Site Facilitators
3. Overcoming Technology Fears
4. Technology Effectiveness

## Methodology of Teaching

Satellite training has many obvious advantages for participants, such as time and distance efficiencies. Satellite training has a specific disadvantage in that it may be difficult for participants to remain focused and interested in the material being presented. A presenter who is boring in a live presentation is even more so in a satellite presentation. Therefore, in order to keep 1.5 hour satellite broadcasts energized enough to keep individuals interested, it was critical to ensure interactivity.

Another reason to build interactivity into the satellite training was to stimulate questions and sharing of information from site to site. The methods of teaching used to accomplish this included short lecture and guest experts in a round table discussion about the topic.

### Preparing for Interactivity

Approximately one week prior to each session, the participants received the chapter material which was to be covered in the satellite session. In addition to text, each chapter included worksheets and a workbook which encouraged participants to begin the process of interaction by completing the worksheets and self inventories about their own businesses. This prepared them to think about the applications for themselves before the satellite session took place. This technique worked well as participants came to the satellite sessions with questions and ideas already in mind. The next step was to provide an avenue for them to get these questions and ideas communicated during the session.

### Action—The Live Satellite Session

Each satellite session began with a brief (approximately 3 to 5 minutes) introduction and review of the key topics presented at the previous session. The introduction was followed by approximately 10 to 15 minutes of short lecture covering the topic. This lecture was a general coverage of the key points for the topic. During the short lecture, the presenter periodically asked a rhetorical question to help the participants stimulate their thoughts regarding the application to their own business. These questions also help the participants to begin thinking about sharing ideas or asking questions themselves.

A brief video clip (approximately 1 to 2 minutes) separated the lecture section from the round table discussion where actual interactivity in the satellite broadcast took place. The round table discussion was designed to appear like a business conference table with papers, pens, and coffee cups. The expert guests were practitioners and entrepreneurs themselves. Note: We found that interactivity dropped considerably when the expert guest was not a practitioner and thought that the guest section was the place for additional lecture.

The round table discussion took place in a talk-show format with the questioning targeted to meet the educational objectives of the session. The talk-show format, practical advice, and experience of the guests and encouragement to call in with questions or opinions generated high interactivity during the broadcast sessions.

## Site Facilitators

Interactivity, whether in person or through technology, is greatly influenced by the skill of a facilitator. Trained site facilitators began the process of developing interactivity approximately 30 minutes before the satellite broadcast began by generating discussions amongst the group itself and surfacing motivators of the participants.

The site facilitators, most of whom never had formal training in facilitation prior to this, were taught about their roles and how to fulfill their roles through satellite training prior to the start of the satellite series. This enabled the facilitators to learn about facilitation as well as the technology they would be involved in.

Effective site facilitators are key factor in developing interaction between the groups. It is worth the effort to select them carefully and train them well. Their comfort level with the subject material as well as the technology provides a role model for the participants.

In addition to facilitating discussion prior to the satellite feed, the facilitators also offered to place calls for participants or encouraged questions from the group during the satellite time. At the close of the satellite feed, the facilitators brought closure to the session with an interactive discussion on the topic and how the participants envisioned applying the information and knowledge they had just obtained.

## Overcoming Technology Fears

Technology fears of satellite broadcast is a potential barrier for both presenters as well as for participants. If presenters are overly nervous or fearful of the camera, they will forget to make eye contact through the camera or may begin rambling on without utilizing communication techniques to generate discussion. Overcoming technology fears for presenters is more difficult than it is for participants. We always encouraged presenters to see beyond the camera into the imagined eyes of the participants. We used the constant reminder that (even though we may not be able to see them) we are communicating with live people who are seeking information.

Participant concerns regarding utilizing the technology were based strictly upon the use of the telephone lines to call in questions during the broadcast itself. The site facilitators were alerted to these potential fears, and they asked questions for participants if they appeared over anxious about asking questions themselves. Once again, the site facilitator played a critical role in teaming up with the presenter in developing a sense of joint purpose and comfort for the participants. Continual encouragement and invitation to participate during the broadcast aided participants in overcoming many of their technology fears.

### Technology Effectiveness

Telephone lines were the type of technology used for interactivity in most cases. In the CyberBusiness sessions, E-mail of questions was also utilized. This cross utilization of various forms of technology is still found somewhat suspect by the general public, who may not be familiar with it. Therefore, it is imperative that the technology be checked and tripled checked to minimize any problems with communication and connections. A simple telephone connection that is scratchy or gets cut off could greatly inhibit participants' willingness to verbally interact during the satellite feed.

### Summary

Ensuring interactivity in satellite training is based upon planning and skilled facilitators. With material preparation and facilitators at each site, the interactivity of a group can be greatly enhanced. In addition, a conscious effort must be made on the part of presenters of a satellite program to keep from leaning on boring lecture as the key methodology for presentations.

### Autobiographical Sketch

**Bonnie Jordan** has 15 years of experience as a management and organizational consultant. Bonnie's experience and specialized services include training and speaking nationwide on such topics as change management, transition management, leadership, trends, organizational development and strategic planning, management development, and performance management. Bonnie has been an instructor at the University of North Dakota Medstar Health Education Network. She has a Bachelor of Science degree in Sociology and Social Sciences and graduate work in Psychology and Counseling with an emphasis in human performance. Bonnie is a certified instructor on Transition Management for William Bridges & Associates, San Francisco, California.

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# Collaborating to Integrate Technology Into the Secondary Science and Math Classrooms

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## Background

Greenville Area School District (GASD) is a small rural school system of 1719 students, 845 in the secondary school, grades 7–12; it is situated in Mercer County in Northwestern Pennsylvania. Beginning to move into the use of technology, the school district felt that it would be an asset to have some on-going help.

Slippery Rock University (SRU) is situated in northern Butler County approximately forty miles south of Greenville. There is a strong teacher education program with 260 of the 7000+ students being secondary education majors. The University also has a teacher education faculty dedicated to working in the field with in-service teachers as well as with their pre-service teachers.

The authors have had an informal partnership for several years that has resulted in pre-service teachers from Slippery Rock University communicating through e-mail with students from the Greenville Area School District. This was done using one e-mail account at the school district. However, through the intermediate unit, Greenville is planning a more accessible system of Internet use.

Because of this informal collaboration, the two authors were asked to attend the Ernest L. Boyer Technology Summit for Educators held in Pittsburgh, PA on April 29–30, 1996. This Summit was the first of four national sites; invitations were extended to universities in thirteen states and the District of Columbia to send teams composed of representatives from the university and secondary schools. Sponsored by the Corporation for Public Broadcasting (CPB) and the National Council for the Accreditation of Teacher Education (NCATE), the mission of the Summit was to engage teachers and professors in a serious discussion about technology and how it can be used to help students master academic content. Designed to motivate and stimulate the participants, it featured speakers such as Uri Treisman from the University of Texas at Austin and Edward B. Fiske, author of "Smart Schools, Smart Kids," and demonstrations which included the Annenberg/CPB Project "Journey North," emerging technologies from Carnegie Mellon University, and the National Urban Technology Center. Awed by future possibilities, participants were dismissed to consider how a partnership could further the use of technology in the classroom and apply for a grant to help begin this process.

### Preparation

The authors left the Summit inspired to begin the process necessary to implement a formal partnership based on technology. Discussions began between the authors as well as with the respective administrators. Although grounded by the realities of resources, we were comforted by sharing like experiences and excited to explore "What if . . ." Similar needs were determined. Informal assessment took place as discussions with various faculty at both institutions to determine where to begin with the task. In talking with GASD faculty, the areas identified as most ready to integrate technology into curricular practices mathematics and science. Once these areas were identified as the focus of this project, more in-depth conversations with these faculty members occurred. Research was also done to familiarize the authors with earlier studies of computer use in these areas (selected sources are listed at the end of this report.)

### Identified Needs

Pre-assessment included informal discussions with faculty; this had identified four areas that the GASD math and science teachers felt were important focus:

- Employing databases for student analysis of scientific data
- Using probing devices to explore scientific concepts
- Developing computer-controlled interactive videodisk programs
- Identifying and learning to use the best software programs to connect technology to curriculum

SRU identified the need to place pre-service teachers (student teachers and field students) into technology-rich classrooms where they would have the support for technology grounded in school realities.

### CPB Next Step Grant

In October 1996, the Request for Proposals (RFP) was received for the CPB Next Step Grant. The RFP was for $5000 and gave nine months to develop and implement. It required that the proposal be uploaded to a site at Vanderbilt's Peabody College and required that each partnership develop a HomePage to post process, progress, frustrations, discoveries, and questions. Because of earlier preparation and pre-assessment, the focus of the grant had been determined: technology was to be integrated into the science and mathematics classrooms. Pre-service and in-service teachers were both included in the proposal. This was to be done by providing initial workshops presented by SRU with follow-up and continued support by means of the Internet. Teachers would be expected to incorporate technology into a lesson based on at least one of the workshops.

## The Proposed Model

The proposed model developed from these identified needs consists of three basic identifiable components. Opportunities for face-to-face meetings would be provided. Communications avenues to discuss experiences with colleagues as well as to access information would be developed. There would be needed support for teachers to try at least one unit using technology.

### Activities

Computer software and equipment were selected based on recommendations by the GASD faculty. Both Macintosh and Windows formats were purchased to meet the needs of both institutions. Software included: Geometry Inventor; Green Globs; Mathematics Toolbox; Differential Calculus; Microsoft Works; Hyperstudio; and Internet Coach. A variety of probes for the TI-92 graphing calculators were ordered. University personnel were recruited to meet the needs determined in the pre-assessment. Student teachers from SRU were recruited to student teach in math and science classrooms at Greenville Area High School. A "kick-off" luncheon was planned to give all participants from SRU and GASD the opportunity to meet each other and talk. During the luncheon, participants had the opportunity to air concerns and talk about what they expected to be included in the workshops. Six workshops were developed and implemented in February 1997. The workshops were:

- Databases for Analysis
- Using the TI-92 calculator with probing devices to explore scientific concepts
- Computer Software for the Mathematics classroom
- Internet Sources for Math and Science
- Using Hyperstudio to develop computer controlled videodisk instruction
- Developing a HomePage

All workshops were "hand-on." Participating teachers were expected to select one (1) area covered in the workshops and develop a lesson plan to be integrated into their classes before the end of the school year. Although the workshops targeted the areas that were specified by the teachers, it was acknowledged that to "do learning" in a different way with new technologies, continued support would make the experience more successful. Once the workshops were completed, a listserv was set up to allow all participants to communicate with each other, sharing ideas, finding support for using information learned in the workshops in the classroom, and posting process and frustrations. This way, everyone participating at both sites could offer support, ideas, and encouragement. This would also provide the experience of learning to teach with the technology by using similar technologies. E-mail between the teachers and the specific "expert" was also encouraged. A listing of all e-mail addresses was given to each participant with the specific expertise of each listed. Quick Cams were purchased so that faculty at GASD and SRU personnel could continue face-to-face communications through the use of CU SeeMe. Times were scheduled for individual teachers to contact Slippery Rock faculty through the use of CU SeeMe. Every effort was made to provide easily accessible support for faculty involved in the project.

The last five weeks of SRU's semester field students from the university were placed in the classrooms of participating GASD faculty; here they observed technology being used to meet curricular needs. At the end of the semester, a final meeting of participants was held to discuss the results of the project and to look at the future of the partnership.

### Results

As a result of this project, there were several observable changes in the math and science classrooms:

- Green Globs, the equation graphing program was incorporated into math classes.
- Calculus class integrated the use of Differential Calculus, a CD-ROM, into some lessons.
- Multiple probes were used with the TI-92 calculators in the science classes.

- Also used in the science classes were Internet sites that were introduced to them in the workshop and others were discovered by the science students, notably Scientists on Tap.
- A HomePage was developed for the school district.
- A short Hyperstudio stack was developed for use with Windows on Science.
- Several student teachers from SRU had the opportunity to participate in and prepare a lesson plan using some form of technology.
- Field students from SRU had the opportunity to observe technology being integrated into the classroom.
- A learning circle was developed which involved a diversity of learning and teaching levels: pre-service teachers, in-service teachers, administrators, and university faculty.
- The use of technological means to continue the dialogue begun at the workshops also modeled using technology for learning.
- A formal, continuing collaboration between Slippery Rock University and the Greenville Area School District was developed.

## What We Learned

As coordinators of this project, the authors learned many things that will be used in continuing this collaboration. Although the project was successful in that units were developed allowing students to use technology in the process of learning and integrated technology into the classrooms, several things affected the project. It was anticipated that access to the Internet would be expanded in GASD before the project was begun. Unfortunately, e-mail connections were not available to the faculty until the beginning of the summer break; faculty only had access to e-mail through one address which limited this component of the project. Both authors, while familiar with both platforms, are primarily Macintosh users. When attempting to use CU SeeMe on the Windows platform, we discovered that additional boards are needed to implement its use; this hindered the use of this technology. However, trips to GASD by SRU personnel compensated for this problem. These challenges are being corrected for future use.

The model used for the project provided initial learning for in-service and pre-service teachers as well as continued support to implement the integration of technology into the curriculum. However, at the end of the semester it became apparent that this was the authors' project not the project of all the participants. A sense of ownership by the participants was lacking which would have greatly increased the effectiveness of the project. Since this project is expected to continue, the model has been revised for the 1997–1998 school year.

## Revised Model

The partnership between Slippery Rock University and the Greenville Area School District will continue to focus on providing a technologically rich classroom environment for both in-service and pre-service teachers. This will focus on the curriculum first rather than the technology. On-going support will continue to be available in this effort. Instructor level ownership will be developed early in the semester. This will be done by moving from the expert-learner design to a learning circle design by using engaged conversations. Active partnership relationships will be sought; contractual or compensated time on a routine basis will be requested. Commitments will be defined continually.

Group reporting periods will be established with face-to-face meetings. The major purpose of these meetings will be for all participants to communicate with each other. Four meetings will be established during the semester with ongoing communications using the listserv, email, and CU SeeMe between meetings. Individuals will be asked to define individual goals before the first meeting. Considering those goals the first meeting will define semester goals for classroom activities while recognizing time constraints. Partner patterns will be explored and small learning circles will be established based on both sets of goals. In-service and preservice teachers, SRU personnel, administrators from both institutions will participate in this meeting to develop partnerships.

The second meeting will be for the purpose of describing and sharing partner/learning circle activities, including the elements of instruction being used. Constraints due to resources will be recognized; support people will be included in order to enable activities.

The third meeting will allow participants to share progress. Successful teaching with technology methods will be discussed. Resource needs will be checked and performance based assessment will be integrated into units.

The fourth meeting will be for the purpose of summative evaluation. "Keeper" activities will be identified; revisions, curricular changes, recommendations for change or integration will be noted. This meeting will provide for a renewal of commitment and change incentive.

This model will require more commitment from the participants and will demand continued communication. But this will also strengthen the integration of technology into the curriculum, continuing and improving the success of this partnership.

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## Autobiographical Sketches

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# The Tension Between Collaboration and Collusion Within-Site in a Distance Learning Community

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## Introduction

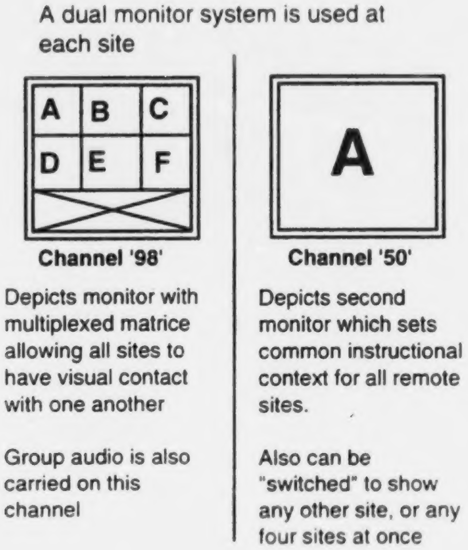
Extended field-based research investigating one implementation of interactive television in a six-site distance learning community has yielded some significant phenomena that deserve to be closely examined and discussed. One aspect of this research concerns the tension between collaboration (i.e., sanctioned interaction) and collusion (i.e., unsanctioned interaction) within-site. As students and on-site coordinators tacitly co-constructed norms for behavior in this new learning environment, interesting patterns of both collaboration, intentionally coordinated by the teleteacher, and collusion, unintended but not prevented, emerged. Students used the freedoms created by the distance of the lone true authority figure, the teleteacher, to develop new ways of interacting with each other to give the appearance of learning.

Recent research on secondary education identifies the learning and social benefits of instructional designs formulated around collaborative learning strategies (Johnson, et al., 1995; Johnson & Johnson, 1995). Other scholarly work identifies specific strategies that can be used to help develop such designs (Cohen, 1994), and current design experiments (Brown, et al., 1993; CTGV, 1993, 1994; Lamon, et al., in press; Scardamalia & Bereiter, 1994) have attempted to implement and test elaborate classroom-based learning communities that integrate technology and collaborative learning strategies informed by cognitive and sociocultural theory. It is my contention that certain distance learning technologies, and specifically multipoint ITV systems that include as part of their design a simulated, visually oriented gathering "whole class" space, wherein all participating classrooms can see themselves, can provide a highly motivating influence on students to work collaboratively within site, as well as the opportunity for instructional designers to develop highly elaborated and collaborative student work groups within sites.

Prolonged field study and exploratory research of a multipoint, ITV implementation offering a secondary course in psychology to 72 high school students in five geographically dispersed classrooms (Kantor, 1996) illuminated the fact that this form of distance learning afforded students at remote sites the opportunity to co-create unique communities of learners within-site. Based on student interviews, observations, the analysis of video tapes, and negative case analysis, it became clear that the culture and social structure that evolved within the distant ITV classroom sites was quite different from that which students normally experienced in traditional, face-to-face classroom settings. The impact of interactive television on classroom culture and social structure resulted in opportunities for student collaboration, cooperation and collusion that were unique.

## Setting and Technology

In this study, a secondary course in psychology was taught to five remote sites by interactive television in a manner that largely adhered to a traditional, lecture-based format. Using fiber optic cable, two television channels in the local cable company's system were used to create a two-monitor presence in each classroom (Figure 1).



A dual monitor system is used at each site

Depicts monitor with multiplexed matrice allowing all sites to have visual contact with one another

Group audio is also carried on this channel

Depicts second monitor which sets common instructional context for all remote sites.

Also can be "switched" to show any other site, or any four sites at once

*Figure 1. Depiction of two monitor presence used in Galaxy County ITV system*

One monitor was used to display the teacher's image or instructional materials such as pre-recorded video materials, text screens and computer graphics, or the output of a video copy stand. The other monitor displayed a one camera output from each of the five geographically dispersed sites. This combined to form a six-way matrix that included whatever was "live" on the other monitor. Essentially, when students at different school sites looked at the two video monitors in their respective classrooms, they saw the teacher prominently displayed in one monitor and themselves and the teacher in the other monitor as part of a live, full motion video, virtual classroom. Audio interaction across sites was provided by a single microphone with an on-off switch and a long microphone cable placed in a stand at the front of the classroom. Because the system was carried over the local cable company's system, anyone in the community who had cable at home or at work was also able to watch one channel of the two monitor presence at a time. The community's role in the implementation was that of a distant audience. However, they had no way to interact with the materials they saw on their TV in real time.

The ITV system thus provided for three different possible zones of human interaction: interactions between schools (inter-site); interactions within each school's classroom group (intra-site); and interactions with the larger community through the public access station. Undoubtedly the zones of inter- and intra- action affected each other and could not exist without one another. This analysis, however, will address them separately, with a focus in this paper on the unique intra-actions afforded by the ITV setting; inter-site and community interactions will be treated only as they were seen to affect intra-site issues.

## Findings and Discussion

For the purposes of this paper, collaboration is defined as those activities students engaged in for the purpose of promoting group and individual learning with the goal of acquiring knowledge of course content and advancing their understanding of relevant concepts. On the other hand, collusion is defined as those behaviors student engaged in while working together to avoid doing what they perceived to be the required work of the course, and to cooperate in their efforts with a goal of evading detection a they attempted to fool the teacher, other students, and distant watchers as to the actual disposition of their efforts.

In the ITV classrooms, students routinely shared notes, spoke to each other as peer mentors to help one another "get" the lectures as they were being delivered by the teleteacher, and discussed the performance of other students as they reacted to comments and materials covered in class. These behaviors were consistent and ongoing, and collaborative in nature. At the opposite end of the interaction spectrum were student behaviors during the two paper-and-pencil assessments given during the course. When students took these tests, their behavior was entirely conventional—that is to say, individual. There was no cross-talk, OSCs proctored the tests, the teleteacher observed via a televised matrix of all groups working diligently, and the second channel alternated views of each site in turn. Students and OSCs co-constructed the way a group of students being tested should look, and there was no form of cheating found as exams were being given or in subsequent examination of video tapes.

These paper-and-pencil examinations were an interaction structure thoroughly familiar to students from years of schooling, and it appears that students automatically demonstrated appropriate behavior as it had been defined throughout their years of experience. This behavior contrasts with behaviors observed in participation structures unique to the ITV setting, and thus new to students. In these situations, and in the absence of specific instruction about the kinds of behavior considered appropriate, students created their own norms, with the tacit approval of the OSCs and no interference from the teleteacher. The first of these new interaction structures occurred when the teleteacher would call a student to the microphone to answer a question, and the second was when one or more students were asked to prepare some work that was meant to be presented across the network and assessed by the teleteacher.

### Up to the Microphone: The Cyrano Effect

When a single student was called to the microphone, presumably to demonstrate individual mastery of content to the teleteacher, that student was frequently assisted by others outside the vision or hearing of the teleteacher. Much as dimwitted but handsome Christian was helped in his wooing of Roxanne by brilliant but ugly Cyrano de Bergerac in the play of the same name, students helped each other to create knowledgeable personas for the benefit of the teleteacher. This "Cyrano effect" was observed in all sites, usually as students helped each other, but occasionally OSCs also participated in the illusion. Eventually, the surreptitious aspect of the Cyrano effect dissipated, as the form of interaction became so common and accepted that students no longer felt it necessary to hide it (see Figure 2 below).

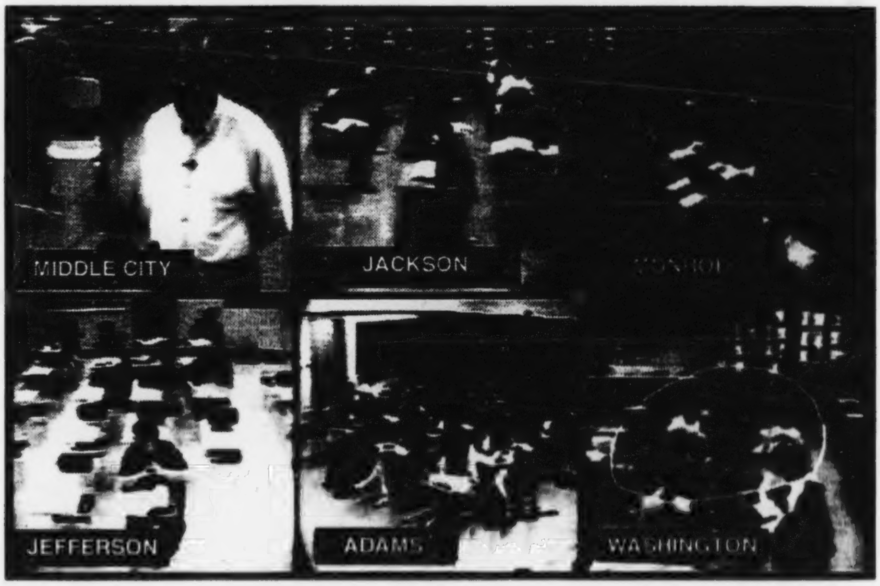


*Figure 2. An example of the Cyrano Effect at an advanced stage*

Was the Cyrano effect collaboration or collusion? At times, these interactions appeared to be truly collaborative, being potentially what others have called "thinking as social practice" or shared cognition (Resnick, 1991). This would seem evidenced by instances when a student faced the camera to receive a question, then turned to one side to listen to a student response, then to the other side to listen to a different student, then 360 degrees to check with the rest of the class before finally responding. At other times, the behavior looked more like mere parroting: a student was asked a question, turned around, received a suggested response, and repeated it over the microphone unchanged. Neither behavior was either discouraged or encouraged by the teleteacher, which leads to the important implication of this finding. Because the Cyrano effect existed in a gray area, tacitly accepted but not officially encouraged, students probably did not make the most use of their peer interactions. The implications for instructional and technological design are clear. Since the behavior appears to be natural and inevitable (given its spontaneous occurrence in all sites), designers should include it in their plans and instructors should teach students how to interact effectively and should allow time and provide structure for meaningful group discussions.

### Collaboration as Collusion

A second form of assessment involved those situations where students were asked to prepare something in advance or during class and then present it to the entire class while being assessed by the teacher. Collaboration became collusion when student team work was used to circumvent the required work or deceive the teleteacher, distant sites, or other watchers. Two incidents of collaboration as collusion occurred in two sites as students and their OSCs reacted to the assignment of producing a collaborative presentation summarizing a particular chapter in the text book in lieu of a traditional final examination. Students in each site were assigned a different chapter to summarize and present in an interesting fashion.

In one site, students who had been assigned a chapter on personality presented the results of a survey that they purportedly had used to self-evaluate their personalities and correlate them with a color. While the presentation was going on, noise and confusion could be heard in the background. Later close analysis of the video revealed that this noise and confusion was actually students calling out to request their colors and scores from a single student. In subsequent interviews, students revealed that one student had organized the presentation and evaluated all student data, and was passing out the results to students who read them over the air. The distant teleteacher had no way of being aware of the extent of this single student's work, and merely thanked her for "helping to organize" the presentation.

A second example of collusion within a site in the preparation and presentation of its final assignment occurred in the site assigned a very difficult chapter. These students took turns giving brief oral presentations on their topic. Close analysis of video tapes showed that students were actually taking turns reading two or three paragraphs directly from the textbook. This fact was not discovered until months after the course had ended, and the teleteacher was unaware of it at the time of the presentation. Later debriefing of students from this site revealed that students (1) remembered the presentation; (2) didn't think much work went into it; (3) believed most of the work was only done by a few students anyway; (4) remembered that their OSC was "involved" somehow; (5) weren't prepared and had to find something to do quickly; (6) didn't think students could "get away with" such a performance in their regular classes.

### Preparers Versus Performers: The Role of Spokesperson

The demands of presenting at the microphone resulted in the evolution of differing roles, as some students were more willing to do the off-stage, academic work and others took on the on-stage role of spokesperson. For example, a trio was assigned to develop questions. Instead, off-stage, a single student created the questions. When it came time to present the questions to the larger group, that student was absent. The remaining group members presented the question as the product of collaboration; however, an error in the question left the student presenters feeling humiliated. The necessarily public nature of the discovery and correction of the error was vastly different from the more private interactions of a typical classroom, and seems to have encouraged some students to allow others to take center stage.

Over time, in each site an individual emerged as site spokesperson. Initially, the students who adopted this role were notable for their courage rather than for any pronounced academic ability. They were brave enough to walk up to the front of the room to the microphone and articulate their own ideas, or the ones fed to them by Cyranos, to the entire ITV community. As time went on the less eloquent of this initial spokespersons were replaced by others who emerged and functioned as facilitators for the site, assisting the teleteacher by picking up a question and responding quickly and by mediating the movement around the class to other students who wished to speak to the teacher or respond to a question. The teleteacher recognized this role by occasionally having the spokesperson poll the group on a particular question. By the end of the semester, this role was so established that in most sites the microphone had actually been moved into the student seating section, next to the spokesperson. This established role had both benefits and drawbacks. It helped to maintain the tempo of instruction and minimize down time when the teleteacher asked an open question. However, it also narrowed the range of student participation to those who were able and willing to take the microphone from the spokesperson.

## Conclusion and Implications

In this distance learning setting, and, it may reasonably be predicted, in others, it is clear that the technology fostered intense levels of within-site student cooperation. Therefore, there is a need to develop instructional designs that foster intended interaction (i.e., collaboration) and thereby reduce the need for student collusion. It is my contention that our energies as researchers and pedagogues will be better spent devising new ways to assess the group dispensation of mind and the function of shared cognition than in focusing on better ways to heighten the control of the teleteacher in the distant classroom in an attempt to emulate the power of a teacher in a face-to-face classroom setting. It is important to explore how new forms of pedagogy are being or can be developed that synthesize these new forms of student culture and communication as they interact with advancing technology, evolving learning theory and changing policy (CTGV, 1995).

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# An Organization's Response to a Distance Learning Initiative

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## Case Study

### Problem Statement

Budget Rent a Car had a need to improve the way new hire counter personnel were trained at their 1050 Corporate locations nationwide.

**Turnover.** High turnover in the Customer Service Representative (CSR) position (52% of approximately 700 hires in 1995).

**Cost.** The average T & E cost associated with training a CSR in 1995 was $1500. This included travel costs associated with sending each new hire to a central training location for an eight day course.

**Candidates.** Budget was faced with a reduced "pool" of prospective new employees because of inability to travel out of town to training course (due to family, school or other work obligations).

**Customer satisfaction.** In 1995, only 50% of all new hires attended the eight day training course. The remainder was trained in a variety of ways (a one day abbreviated course, a buddy system, on-the-job). This resulted in significantly lower customer satisfaction levels.

**Shifts.** Second-shift, third-shift and part time employees were not able to attend class held traditionally during normal work hours, Monday–Friday.

**Resources.** Limited training resources were available to conduct the new hire course. One trainer had the responsibility of covering many locations in several states.

### Feasibility Study and Findings

Clearly, the problem Budget faced was how to get a higher percentage of its new hires trained at a lower cost per person (due to the high turnover rate), and do so without compromise to the effectiveness of the training required.

**Losses.** Financially, the current costs (actual and opportunity) associated with training were determined. It was found that 77% of the funds spent on training were lost on new hires that did not remain with the company for at least one year. Voluntary termination, involuntary termination and planned reductions due to seasonality of business, all contributed to the turnover costs.

**Feedback.** CSRs were interviewed to assess the training they received. The results varied widely, indicating that the training was not being done consistently. The current training methods were studied. Course length and content varied by region, indicating a lack of consistency.

**Analysis.** A cost benefit analysis gathered information on annual expenditures for new hire training, the amount lost due to turnover and how much turnover could be attributed to a lack of proper training.

**Acceptance.** Meetings were conducted with Management to determine the need and readiness of the organization to embark on Distance Learning. Although cautious, Management agreed, finding that all indicators pointed to a Distance Learning solution.

**Training materials.** The existing materials were reviewed to identify the critical components and how they could be adopted to a Distance Learning methodology.

**Systems.** The computer system to be trained was housed on an AS/400, and was accessed through terminals at the locations; the midranges were located at the corporate office. Research and testing was done to determine the feasibility/specifications for connectivity, voice communication, hardware, software, facilities, and support personnel required.

### Proposal/Project Guidelines

It was determined that Budget would benefit greatly from a more flexible method of training; one that relied far less on geographical boundaries and time constraints. In short, training at a distance was a perfect fit. A proposal was submitted to develop BEACON (Budget's Education And Communication On-line Network). The components of the project included:

**ROI.** The capital expenditure, when compared to the current training requirements, would be paid off within nine months. The project was expected to take nine months to fully implement.

**Education centers.** Three corporate training centers would be built. Each would include eight PCs with connectivity to the midrange system, and a modem to enable a one-to-one relationship of Education Center PC to student PC. To enable voice communications, an existing teleconferencing bridge was expanded.

**Major locations.** Approximately 100 field locations would be equipped with one to four PCs that would have one-to-one connectivity to an Education Center PC via a single analog phone line. While the PC would provide the data application link, a second analog phone line would be used in conjunction with a headset telephone to provide audio connection.

Locations would be selected based upon their annual number of new hires and their proximity to other Budget locations.

**Additional locations.** At smaller locations, or those with extra training requirements, six laptops workstations would be purchased to be shipped and returned as needed.

**Materials.** A combination of self-paced reading materials and hands-on systems exercises would be utilized to create a well-structured adult learning experience.

**Management involvement.** The success of BEACON would be dependent on the commitment of each location. A detailed introduction, in the form of a roll-out plan, would be designed and introduced to the organization.

**On-site support.** Due to changes in training procedures, some site facilitation would be necessary.

**Pilot.** A pilot would be conducted (representative of the Corporate audience) to gather technical data and implementation process information for the full scale rollout.

**Other applications.** After implementation and evaluation, the BEACON system would be expanded to train the other Mainframe, Midrange, and PC-based systems used by the field locations (including Microsoft Office, and proprietary mainframe-based accounting and PC-based human resource information system).

### Six Month Effectiveness Study

Once the proposal was accepted and capital expenditure approved, a project plan was developed, including pilot testing and a phased rollout. Six months after implementation, the effectiveness of the BEACON training methodology was studied.

**Completion.** The project was completed three months ahead of schedule and $100,000 under budget.

**T & E.** All travel expenses have been eliminated from the new hire training budget. This includes both participant and instructor expenses.

**Penetration.** Currently, ninety percent of all new hires are properly trained. This reflects a 40% increase over prior years.

**Resources.** Due to a reallocation and more effective use of resources, no additional hiring was necessary.

**Turnover.** Students who attended BEACON training have a lower rate of turnover, versus those who attended traditional training, buddy training, or were not trained at all.

**Candidates.** Budget's "hiring pool" increased to include those previously unable to attend training (i.e., parents, students, and those employed in more than one job).

**Connectivity.** The shared connectivity of personal computers, when joined with voice conference calls, provided a solid interactive base for the training.

**Buy-in.** Management approval of the new methodology greatly enhanced the success of the project. Locations with a strong contact person made the most effective used of their BEACON equipment.

### Autobiographical Sketches

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# Cooperative Efforts to Simplify Web Page Instruction

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## Background

Web pages are an effective way to present an entire distance education course or to supplement a "standard" lecture course; some have even suggested that a more appropriate descriptor is to use the word "distributed education" to encompass both. However, it is becoming increasing obvious that it takes substantial effort to create and maintain web pages.

Initially, web pages for a particular course were prepared by individual instructors, which seems to be the standard model when web courses are used as adjuncts to a lecture course. This approach requires a lot of extra effort or as the Brook's article (1) recommends, "ask for release time." In the major distance education institutions such as the open universities it is more likely that an entire team will be involved in the preparation of course materials. During initial experimental stages, individual efforts were and still are entirely appropriate. However, many studies by the National Learning Infrastructure Initiative (NLII) (2) of Educom, groups such as the National Council of Higher Education Management systems (NCHEMS) (3), the Flashlight Project (4), and others (5) have established that, for any system to become economically successful, there must be an economy of scale applied to the process. One of the best discussions of the economics of scale is to be found in Sir John Daniel's book, "Mega-Universities and the Knowledge Media" (6), in which it is argued that the Open Universities have reached this economy of scale with their 100,000 plus students. It is likely that this scale-up issue and its lack of resolution has been one of the causes for slower than expected technological change in the classroom (7). To be blunt, small experimental projects, no matter how successful, will not have major impact or be widely adopted until the economies of scale can be applied (3–7). In this presentation, we will address some methods to effect scaling for educational delivery via the internet in our standard traditional settings, although some of the ideas can be transferred to general distance education activities. Distance education deliverers have long understood these issues and often implemented solutions ahead of traditional universities.

To achieve scale up, several factors must be in place. The tools used to prepare materials need to be standardized and efficient, and the efforts of many workers need to be coordinated and combined. Fortunately, cooperative networking via the internet simplifies coordinating and combining efforts. Additionally, there must also be incentives provided for the workers laboring on the project (see Brooks article) (1). It is highly recommended that instructional support staff be enlisted to help but this is often not available in our more traditional settings.

Scale up can happen at several definable levels. At the simplest level, instructors within a department or college can collaborate to share materials across multiple sections of large classes or in one extensive distance education delivery system. An intermediate stage is what is found in Open University systems with their design teams and content consultants. We will only refer to this mode in passing and in relation to other schemes. At another and often larger level, traditional providers (i.e., publishers of textbooks) are unilaterally developing web sites. This has a huge audience as the number of students using any one text in a large introductory science course is large. The example which we will discuss has 70–80,000 adoptions. At both extremes, there are notable advantages and problems that will be explored and debated below. However, both extremes have the advantages of some scale and cooperation which can be exploited.

The scale up process requires that this web site provide a lot of correct, useful, and exciting information and this site must be attractive to the wide variety of faculty and students. Without these characteristics, the web site will be unused and will not achieve anything of substance. NLII has found many examples of good technology which have been underutilized for all of the wrong reasons (7). The sites must have easy access (often by various technologies), be easy to create and use, and use the appropriate level of technology. Furthermore faculty involvement must take as little time as possible (i.e., be highly efficient). The site must also be designed subject to the following criteria:

- What is to be accomplished?
- How will it be accessed?
- Who is being served?

## Examples of Scale Up and Cooperativity

We now explore two models which illustrate these many issues, especially those of collaboration and economies of scale.

### LSU ChemistryCentral

Since 1994, we have been developing and using a suite of programs which allow us to prepare and administer quizzes and practice exams via web browsers. The quizzes and exams are automatically graded and provide immediate corrective feedback to the students. Typical web pages for general chemistry sections consist of postings of course schedules and syllabi, some lecture notes, grades and options for student/faculty communication (usually via e-mail, but sometimes with First Class). Some faculty then began to produce more complex pages for their own classes. We soon realized that considerable faculty time was used to generate web pages for very similar courses (or multiple sections of the same course), and the normal variation in style and content from one instructor to another brought forth the issue of quality control. We have now coordinated web page development and have a central location for all Chemistry Department Course Material with common tutorials, help pages, and related materials (one stop shopping).

We have created ChemistryCentral for our large lecture courses (several thousand students total) as well as several junior/senior level courses. A developmental version can be found at http://www.chem.lsu.edu/chemcentral.html.

This new site now is extended to include simple templates for the faculty to create syllabi for their course, generate practice exams and generate random quizzes from a test bank (http://www.chem.lsu.edu/instructor.html). Faculty now have to spend very little time placing their course-related materials on-line They need almost no programming skills and can share materials used by other faculty teaching at the same time or from archives. In addition, undergraduates are hired to help us in this process. This enables our department, with a long history of support for excellence in teaching, to allow faculty to be both original in web offerings and efficient in their time allocation.

The Chemcentral location (http://www.chem.lsu.edu/chemcentral.html) contains material on several topics, some material is course specific and some material is general. These include the following items: First Class™ conferencing and real time tutoring, syllabi with well-defined course requirements and goals, consistent encouragement of email responses back to the faculty member, quizzes which are graded on-line, random test generation from our test banks (including access to archived test material), instructor specific material, and modeling and visualization tools, often coupled with tutorials. All of this material is located at one web site that has a consistent interface and is accessible to all students.

Feedback from faculty and students is encouraged by having simple hotlinks to send email to the Chemcentral creators and by monitoring log files to detect which items are receiving substantial traffic. The nature of web pages lends the on-line materials to immediate modification if faculty or students find alterations of format, content, etc are necessary.

### Prentice Hall CentralScienceLIVE (part of ChemCentral)

Book publishers are very uncertain as to their future role in this new electronic age with very efficient global networks and their digital libraries/databases. They still want to be content providers. In 1996, Profs. Hall and Kestner were asked by Prentice Hall to provide materials for a unique web based delivery system of supplementary materials for Prentice Hall's major chemistry textbook. We now know that at least three other introductory chemistry book publishers were pursuing almost the same tack. We will speak from our experience with Prentice Hall.

With corporate backing of Viacom, Simon and Schuster and all levels of upper administration, Ben Roberts, Chemistry Editor at Prentice Hall, organized a team of academics and professionals to create a web environment which would contain many types of supplementary material for their very popular chemistry textbook by Brown, LeMay, and Bursten (8), which would be made available via a password given to each student. It is important to realize that the introductory chemistry textbook market is gigantic and competition likewise is very intense for a share of that market. The Brown book is one of the leading adoptions with about 70–80,000 students using the text and probably over half getting passwords to the web site. It is interesting that we are therefore dealing with an economy of scale which rivals those appropriate to the various Open Universities. We would expect similar rules relating not only to economics of publishing but to competitive pressures to apply technology will be relevant to these publishers. These are not unrelated to business competitions and the role of technology as discussed by both Porter (9) and Daniel (6).

Using a team approach (including graphics and computer experts as well as editors and academics) the web project was able to move quickly (7–9 months for most of it) and also produce a very high quality product. The two of us were involved as content providers (mostly involving problem solving) who were also very knowledgeable of what was technically feasible. We continue to push those limits but the result is clearly superior to what we could have done either individually or as a department. However such scale is only possible with a huge audience that is willing to pay for that overhead. Furthermore the publishers are increasingly required to do this to retain their competitive edge.

The site is impressive (http://www.prenhall.com/brown) with its array of material including very *Current Topics* right from New York Times and related science news feeds, a *Communication Center* with a listserve bulletin board feedback, Web Resources from all over the globe, a *Visualization Center* with computer graphic models of molecules under student control, and Tools like periodic tables or essential conversion factors or data needed to work problems. There is a large *Problem Solving Center* (our main contribution) with practice quizzes with feedback including reference back to text via pdf files and exams which are graded as well as matching problems using visual representations along with MCAT questions. There are also *RealAudio* clips on each chapter and the ever necessary *Help* button. All of these selections are chapter specific or general depending on the needs of the user. An attempt was made to appeal to our learners using all possible modalities.

But there are tradeoffs. We have to accept the book contents and to some extent its organization; but we get all of the goodies. The resources available for development of the web sites are much greater than a department (or departments) is able to generate. Furthermore their site is not static, but responds to global issues as well as users interests.

## Next Steps, the Future

In some sense, the future applications of this technology are quite clear. Once we have all of this material prepared, it can be used in various ways. Courses and curricula can become modularized, no longer defined by the length of the semester, but rather by the total amount of material and the interests of the school, the faculty and of course, the students. The commercial and even our departmental efforts are suited to those new designs. Faculty will continue to prepare their own course materials, but with an increasing emphasis on collaboration with other instructional efforts, choosing to modify rather recreate all course materials. Probably we will see more of the type of programs which now are contained in some course CD ROMS in which the professor can use the CD material but she can also add or modify some as well. It is simply too time consuming to recreate the material for every time one teaches a course. The textbook will be subsumed by the much larger body of material posted on web pages.

It is clear from our experience that cooperation with other faculty and with commercial providers is certainly the most attractive future. How this material is presented to the student today seems more dictated by their access than by our ability to gather or even develop unique learning presentations.

*Note:* This entire paper with hypermedia active links will be available along with the PowerPoint presentation at http://kestner.chem.lsu.edu/wisc97.htm.

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*Added Note:* Obviously we are not alone in preparing materials for the web for Chemistry. Many others are developing even more elaborate internet course materials for chemistry and other sciences. See *Using Netscape as Presentation Manager* as paper #1 of the Summer 1997 on-line conference (CHEMCONF) at http://www.wam.umd.edu/~toh/ChemConf97.html, for nice examples of different ways to use the web to supplement courses. Other excellent references for chemistry instruction include http://www.inform.umd.edu:8080/

EdRes/Topic/Chemistry/ASIS96.html, which refers to many other examples. To name just two of the hundreds on the web.

## Autobiographical Sketches

**Neil R. Kestner:** Professor of Chemistry, Louisiana State University; Ph.D., Chemistry, Yale University, 1964; Research Associate, September, 1963; Assistant Professor of Chemistry, Stanford University, 1964; Associate Professor, Louisiana State University, 1966; Professor, 1972; Chairman of Freshman Chemistry, 1974; Chairman, 1976–1981, 1991–1994. Alfred P. Sloan Fellow (1968–1970); Fellow, American Association for the Advancement of Science.

Research and Educational Interests: Theoretical Chemist with 87 publications; leader of LSU Baton Rouge Campus' and the LSU System's participation in Educom's initiative, NLII, National Learning Infrastructure Initiative; chair of the Provost's Task Force on Distance Education; member of LSU TLTR; founder of MentorNet for High school student/LSU interactions; published papers on the use of mastery learning and the Keller plan in higher education; extensive internet experience; member of Herb Society of American Electronic library project; organizer a symposium on copyright in the twenty first century; member of task force of AAAS *Transitions from Paper*. Presenter at 12th Conference on Distance Teaching and Learning. Various funding over years by Dreyfus, NSF, DOE, Air Force, Sloan Foundation.

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# The Promise and Perils of Web-Based Training

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## What Is the Internet/Intranet?

The information superhighway is simply a metaphor used to describe the Internet, Intranets, and commercial bulletin board services (BBSs). The Internet is a worldwide network of over 50,000 computers operated by businesses, governments, and universities. The Internet's popularity exploded with the invention of graphical "browsers" for the World Wide Web. The Web is a subset of information of the Internet, and browsers enable you to use a mouse for point-and-click navigation. Currently there are over 250,000 different locations of the Web, which are called "sites" or "home pages." Each site contains text, graphics and links to more information.

Similarly, "Intranet" is the term that describes a corporation's internal network of Web-based computers. Because an Intranet's link to the outside world is broken, it can usually offer security and speed advantages over true Internet-based computers.

Finally, Bulletin Board Systems (BBS's) are networked computers that typically offer additional features and better performance over true internet networks. Examples of commercial BBS's include America Online, CompuServe and Prodigy. One disadvantage of BBS's is that users need customized software to access them.

## Benefits of Web-Based Training (WBT)

A universal challenge for trainers is how to deliver up-to-date training and support materials to a large dispersed audience, in a cost efficient manner. The power of the Web is that it can potentially solve this problem. Specifically, the benefits of Web-based Training (WBT) include:

- **Universal language.** Using HyperText Markup Language (HTML) you can build your training program once, and it will run on most computers and operating systems (Macintosh OS, Windows 3.1, Win 95, UNIX).
- **Easy, affordable distribution.** Your content resides on one computer (your server) which students access when they dial in with their modems. This provides instant distribution to an unlimited number of students, worldwide. No time or expense is associated with duplication, packaging, postage, or other logistical efforts. This instant access also provides a powerful infrastructure for Just-in-Time Learning.
- **Up to date content.** With a central location for content and the ease of HTML programming, all of your text-based and graphical content can be updated in a matter of minutes.
- **Affordable technology.** Unlike other breakthrough learning technologies (e.g., videodisk, CD-ROM, CD-I), WBT won't require a large expenditure for new

hardware or software. Employees that work from home offices (such as sales representatives or other "telecommuters") generally have the computers and modems that are required to reach a computer network. Accessing Web-pages simply requires the addition of browser software, which is available free of charge on the Internet, or can be purchased for a nominal fee.

## Five "Levels" of WBT

For the last two years, training departments have been using the Web to train and support their students with great results. While there are a great number of ways to use the Web, all WBT applications fall into one of five categories:

### Level 1: General Communication

At the simplest level, the Internet facilitates communication between trainers and their students. Electronic mail can be used by trainers to distribute course schedules and homework, while students can use e-mail to register for courses and ask questions. At a more advanced level, trainers are organizing real-time "chat" sessions where up to 20 students communicate at the same time, using their keyboards. These virtual workshops are often centered around a guest "speaker" who provides information and responds to student questions.

### Level 2: Online Reference

Using the HTML language, trainers can create an entire online library of hyper-linked references that include text and graphics. Content might include product learning manuals, safety manuals, technical documentation for computers and software, and course catalogs. Because this information is often available electronically (as a word processor document), it is relatively easy to convert it into a hyper-linked reference.

### Level 3: Testing, Assessment, Surveying

Computer-based testing has long been the preferred method for assessing students because of its many advantages over traditional paper-based methods. Using the Web for tests and surveys goes a step further by completely automating the process of retrieving new exams and sending back score files.

### Level 4: Distribution of CBT

Many departments are using networks to stage computer-based training modules, which can then be downloaded by students on an as-needed basis. Again, this eliminates the time and expense associated with disk duplication, packaging and distribution. Because students can download individual modules whenever necessary, this structure supports efforts toward Just-In-Time Learning.

### Level 5: Delivery of Multimedia

The cutting edge of WBT is delivering interactive multimedia in real-time, from the network. This has been made possible only recently with the advent of new programming tools like Sun's Java and Macromedia's Shockwave. These tools enable students to experience interactive lessons complete with sound, animation, and video. While multimedia delivery over the Web is now possible, it isn't always practical. The speed of most of the modems in the field today make the display of complex graphics and playback of video extremely slow.

### The Future of WBT

As with any new technology, Web-based training offers great promise, and comes with its own set of challenges. But with major advances in this field occurring weekly, and dozens of training departments already realizing the benefits of WBT, the time to get on the Information Superhighway is now. Individual trainers should make Internet Literacy a personal goal, and departments should formulate a strategy for taking advantage of this new medium. By starting now, and planning carefully, you'll guarantee that your department provides up-to-date training in a timely and cost-efficient manner in the years ahead.

### Autobiographical Sketch

As president of ACI, **Kevin Kruse** has played an integral role in the development of performance support and training tools for over 100 leading corporations. In the last year he has become a pioneer in the field of Web-based Training (WBT).

Mr. Kruse's work has been featured by several leading publications including *Newspost, Multimedia Training, Training, CBT Solutions, L.A. Times* and *Selling Power*. Most recently, Kevin was the recipient of two industry awards, the ASTD 1996 Blue Ribbon for Instructional Technology, and the ISPI 1996 Award of Excellence for an Instructional Intervention.

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# Collaboration of Schools With Distinct Characters in Networks of Schools

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## Introduction

This paper investigates interaction between developments in educational technology and some social and educational determinants of the Finnish society regarding the emergency of inter-school collaborative consortia. We will approach our task both at macro and micro levels.

## Background for Collaboration

### Framework

Our starting point can be described with Bromley's (1997, 58) question about who uses a technological artefact (a network of schools in our context) and why. He presents an analytical model of interaction between technology and society at two levels: 1) the context of development and 2) the context of use. In brief, Bromley's model suggests that in the context of development the encounter of previous technology and social determinants produce new technology which faces social determinants in the context of use, producing social impacts (cf. Bromley 1997). We apply this model to analyse who is involved and why in the school network of our case study. The context of development belongs to the macro level while the context of use has a micro level character. Our presentation analyses some of the salient characteristics of schools that join inter-school electronic consortia and establish distance education links. Our case is about two small rural schools, one a primary school in southern Finland; the other a junior high school in Finnish Lapland. The third school analysed is a big urban school belonging to the university of Helsinki Department of Teacher Education. Each of these schools has interests of its own for collaboration.

### The Macro Context of Development

Educational technology was introduced into Finnish schools in the early 1980s mainly through CAI packages and later by using the computer as a tool. A shift in emphasis took place in the early 1990s when more attention was paid to computer-mediated communication, electronic mail, computer conferences and other telematic tools, which could help create an open, multimedia-focused and globally networked learning environment based on a constructivist conception of learning. (Tella, 1996) During the past five years, there has been an intentional effort made by the Department of Teacher Education at the University of Helsinki to develop inter-school networks through several projects, like Utopia (Investing in Knowledge, 1997), Kilpisjärvi (Kynäslahti, 1996), and LIVE (cf. http://www.helsinki.fi/kasv/media/projects/live/live.html).

The social and educational determinants of the macro level, for our case study of school networks, cover a wide range of changes taken place in Finnish society. The most fundamental of them all is the official governmental policy of social development towards an elaborated information society concerning education as well as other social areas. The Ministry of Education has initiated a developmental program Educational Training and Research in the Information Society—National Strategy (1995), which challenges educational institutions, including schools and departments of teacher education, to meet the requirements of a future society and to benefit from the opportunities that an information society can provide. Another feature in the governmental policy over the past few years has been the decentralization of power, which in education concerns, among other things, the shift towards school-based curricula and site-based school management. Schools are more entitled now than ever before to establish their own educational policies.

A special characteristic of the Finnish teacher education system is that it is located in universities. Another special feature is that training schools are an integral part of the teacher education departments and thus belong to the universities. Over the last few years the utility of this kind of system has been questioned several times, mostly by central administrative authorities of universities and by faculties outside the educational field. The future of the teacher training schools is still unsure in Finland, even if the educational sector itself fully understands their importance as part of the training system.

Rural education is also facing problems in Finland. A significant factor for the situation was the deep economical crisis at the beginning of this decade leading to the closing down of a number of small rural schools. This tendency is still active and therefore people living in rural areas try to find new ways to improve their living conditions and to ensure the supply of local educational services. The renewed change of social structure in Finland makes this even more difficult when people from rural areas move to big cities in southern Finland.

### The Micro Context of Use

One of the outcomes concerning the encounter of the social and educational determinants and the development of educational technology at macro level has been the establishing of inter-school collaborative electronic consortia through classroom focused distance education. In the context of use, this 'new technology', ie the network of schools, faces the user context at the micro level. By classroom focused distance education we refer to an educational setting where, usually in addition to an on-site group of pupils, a teacher instructs one or several groups of pupils at distant sites using communication and information technologies (Husu, 1996).

Our case consists of two rural schools: the Kilpisjärvi junior high school in Lapland and the Ruskela primary school in the neighbourhood of Helsinki metropolitan area. The emergence of school networks gave people in the Kilpisjärvi village a chance to establish a local junior school and to enhance the living conditions in this geographically isolated small village. As there was no high school in the village before, many families had to move out of the village when their children reached the school-going age. For the Kilpisjärvi school, networking is a key to delivering competent teaching. Without the outside resources provided by the electronic network, the performance of the school would be very difficult, even impossible. Networking has guaranteed the quality of education and it has also provided the parents an opportunity to compare the quality of local education to that of the other schools. One important thing, concerning Kilpisjärvi, is that the network has created a link to outside society and connected the Kilpisjärvi students to other children of their age who live in different kinds of environments and carry out a distinct realm of life.

In Ruskela, networking has made it possible to widen the educational activities of the school to concern also Grades 5 and 6 and there is no need anymore to transport pupils of these grades to a bigger school. An important factor for these developments has been the increased power delegated to the local level, which enables the school to establish outside links and to cross the traditional administrative boundaries between different municipalities.

For the rural schools networking is a way to try to ensure the continuity of their existence and a key to enhancing the quality of education. It provides the school with an opportunity to decrease the restrictions that a small size or a isolated location causes and to widen curricular options. For rural people networking is a way to get involved in the developments of an information society and to fight against the threats of having to leave their home village. School networks are not, however, any final solution to the problems of rural education. Still, our cases show that networking, and educational technology in general (e.g. Barker and Fall, 1994; Stevens, 1994), increases potential to develop education in rural areas and to enhance educational equality.

The Teacher Training School in Helsinki is a big urban school with a great variety of courses offered in several subjects. Its interests to participate in an electronic network are not based on any need for widening its curriculum or improving the quality of teaching. As a part of the university and teacher education, training schools are expected to conduct research and development work in the field of education. They have, however, not succeeded too well in this task. The training school system has been criticized during the past few years and their future is still rather uncertain. On the other hand, the general educational policy in Finland, promoting initiatives fowards an information society, and latest developments in research on educational technology have created an increased interest in school networks. Accordingly, our network provides the Teacher Training School an opportunity to be involved in educational research, to experiment with new forms of education, and to predict the future character of teachers' work. The network also offers the Teacher Training School a chance to train student teachers to use distance education technologies and a chance to develop pedagogy for classroom focused distance education. The interests of individual teachers, on the other hand, deal mostly with professional ambitions to develop their teaching according to requirements of the future information society. Despite the sovereignty of the school in delivery of education, also the Teacher Training School gets extra resources through the net. It gets 'classrooms' for student teachers. The school is overbooked and there are difficulties to organize practice periods for all student teachers and thus student groups in Kilpisjärvi and Ruskela work as outside resources for practice periods. The network is also a way to include the rural schools in the pedagogical context of the student teachers.

## School Network Practice

Networking has created novel ways to organize the delivery of education which we might call a new 'school network culture'. It is a certain kind of educational outcome of the interaction between the network and its users. We first make some pedagogical remarks. In small schools students traditionally study together in mixed-grade classrooms. Networking classes enables the differentiation of teaching in a way where some classes take part on the on-line lesson while others are taught by the local teacher. The local teacher is able to concentrate on teaching one class only instead of taking care of several simultaneous learning processes of different classes. Thus, along networking the local teachers have got more time for their attention per each pupil. The local teachers sensed that in this way they have relatively free hands to organize the instructional process, which encourages the teachers to develop their pedagogy and experiment new kinds of pedagogical approaches. Teachers have found that networked collaboration has become an essential part of their work, giving them options for a new kind of in-service training and fresh ideas. Despite the professional questions, interaction between teachers also work at the personal level. We can witness a networked teacher community which is significant for small schools (Cole, 1989; Stevens, 1992) in breaking the pedagogical isolation.

Inter-school networking brings together schools with distinct characters and people living in different kinds of environments and diverse walks of life. Through the net the pupils can virtually experience the life styles of their classmates though still staying in the familiar settings of their home community. They become border crossers between their own background and the diversity of human lives they face in the network (Kynäslahti, 1996). Here we come across Giroux's (1992) ideas of border pedagogy concerning students as border-crossers moving in and out of borders that are constructed around difference. Danaher and Wyer (1995) use the issue of border pedagogy in the education program of the children of Australian itinerant people, which focuses on the special life style they belong to but which also introduces the life style of the non-itinerant majority of Australian people to them. MacGibbon (1997) reports about a Canadian network where students in Creek communities in northern Quebec take preparatory college-level courses without leaving their home communities and in this way orientate to the unfamiliar Euro-Canadian environment that they will face in post-secondary studies in southern Canada (MacGibbon, 1997).

## Conclusion

We started our paper by asking *who* and *why*. We have analyzed who is involved in our case study of school networks and what are their interests in collaboration. We saw that these interests have wide social and educational backgrounds. In the user context there come more determinants to play creating new kinds of practices that we called a school network culture. Inter-school networking brings together schools with distinct characters and different needs. Our case shows how schools affected by distinct social and educational determinants face each other in a network and how their local needs can be met through networking.

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## Autobiographical Sketch

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# One Size Technology Does Not Fit All: Upper and Lower Level Undergraduate Courses on the Internet

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Dakota State University's English department is a small, closely knit group of dedicated faculty. For the past four years, the English faculty have gone on an annual two day retreat where they have discussed and revised curricula and program offerings; they have held monthly pot luck dinner "meetings" to discuss issues of concern; some of the faculty have team taught courses; some have co-authored articles and made panel presentations at conferences such as this one. One might therefore expect that distance education courses offered by Dakota State's English faculty would have a unified sameness to them; yet, as you will see, nothing could be further from the truth.

We will explore two undergraduate English courses: English 101, Composition and English 484, Literary Criticism. We will explore some of the issues that led to the designing of these courses and examine some of the outcomes. We will begin with English 101, Composition.

## English 101, Composition

English 101 is a required General Education course. As its number suggests, it is a first year course and its goal is to teach students "the skills that are needed for effective written communication in the academic community. Using computer technology for rhetoric use, research skills, MLA style and critical thinking, students complete short researched compositions" (DSU catalog). When we moved this course to the Internet, several issues became apparent. These included student population, scheduling, technical considerations, and course content.

The biggest consideration in creating Internet Composition was the diversity of students. Some were traditional Freshmen who were on campus. Some were high-school seniors who were beyond their high school writing classes and some were men and women already in the work force taking the class because they wanted to "brush up" on writing or change their vocation. I knew that not only would their writing needs be different, but their technical knowledge and resources would also vary and of course their schedules would be different. I wanted all of these students to get what they needed individually out of the course and still be able to collaborate to a certain extent, to benefit from each other's unique experience and opinions.

The scheduling problem was one of the easiest to solve. An "open" format, where I sent out all of the assignments and let the students complete them at their own pace would obviate the scheduling problem but was not acceptable to me pedagogically. I knew that some of my students wouldn't have the kind of self discipline it takes to do well in that kind of a course. I also had the idea that some of my students would interpret it as laziness on my part, or compare it to the type of correspondence programs that you see advertised on TV. It wasn't my idea of quality education. The other extreme would be to have very specific class times. This wasn't attractive either because it took away one of the primary benefits of taking a class via Internet: flexibility.

What I worked out was a schedule where something was due every two days. Sometimes it was homework leading up to an essay (analysis of a reading, description of audience, freewriting) and sometimes it was part or all of a rough draft. This allowed the students some flexibility about when they completed the work (during the day or evening) while ensuring that they kept up with the work and allowing opportunity for feedback from myself and from each other. It also helped me monitor against plagiarism since I could watch their progress.

The students responded well to this format. They liked knowing ahead of time when an assignment would be posted and when it would be due. One student requested a minor change in the scheduling because she couldn't get to a computer as often as the rest. Since it was only one student, I was able to grant the request with very little inconvenience to me or the class. However, I realized that scheduling is something that has to be made clear in the course description, so that a student wishing to sign up for a class knows exactly what to expect.

Another part of the equation was technical considerations. Although I wanted collaboration, I didn't want the complications that sometimes come with trying to incorporate media that are too technical, or require high-end computers to run. The last thing I wanted to do was exclude any students because they didn't spend enough on equipment. I also didn't want to spend half of my efforts teaching technology instead of teaching writing. For example, I thought about incorporating a synchronous discussion program which had been a successful tool in my traditional composition classes (Daedalus *Interchange*), but I realized that it would add not only technical difficulties, but also scheduling problems.

I decided that the lowest common denominator is electronic mail. It is simple and widespread and with the use of a listserv (an email discussion group), I could incorporate asynchronous discussion. Email is limiting; most versions don't allow much formatting and all but the newest versions can't handle hypertext. But I decided that it was appropriate for a lower level writing course, where the focus should be more on the thought process than on the text's physical appearance.

Course content posed the greatest challenge. I wanted to tailor the course so that each student could get out of it what he/she needed most, but I also wanted to incorporate collaboration so that the class would retain the same sense of community that a regular class has and so the students could learn from each other. I decided that I would start the semester with as much discussion and group effort as possible and move gradually to completely individual work. The first topic was one I chose, and that the whole class read about, discussed and finally wrote about. For the next paper, I gave them a choice of three topics and finally I let them choose their own topic and make up their own schedule for completing the final essay. I also encouraged the students to narrow the topic or audience in a way that reflected their individual interests or goals. For example, if a student was writing about affirmative action, I might encourage the older, working student to consider affirmative action in the work place and the traditional student to consider affirmative action in universities.

Students collaborated by sending all their homework assignments to the class listserv so that other students could read and comment on them. I also included a system of peer editing where I paired them up and they sent edits to each other through email by simply using the "reply" command that all email systems have. Unfortunately, students were reluctant to react critically to each other's writing, a problem I am accustomed to in my traditional Composition classes.

The final assignment for the course was an assessment essay. Students reacted favorably both in accomplishing their own goals and in their satisfaction with the course as a whole. The students off campus were especially appreciative of the flexibility that the course provided. Most encouraging to me was the sign of general improvement in the students' writing throughout the course. It proved to me that distance education can be quality education.

## English 484, Literary Criticism

Literary Criticism is an upper level course designed for English and English Education majors. It provides an historical survey of "classical" literary criticism from its beginnings with Plato and Aristotle up through the early twentieth century: students read texts as disparate as Aristotle's "Poetics," Pope's "Essay on "Criticism," and TS Eliot's essay "On the Metaphysical Poets." This course had been taught by a colleague for several years using a traditional, lecture-based approach. Because this was my first time teaching the course, I first had to determine how I might want to teach the class in a normal classroom and then how I might adapt those techniques to Internet delivery.

As a stroke of good fortune, my class demographics were fairly uniform. I began with sixteen students: all were degree seeking English or English Education majors; all but three were physically located on the DSU campus; two students who normally commuted to campus decided to take the course from remote sites; one student was located in Tennessee. All of the students were well grounded in technology: they had all taken a basic computer literacy course which teaches the basics of using email and accessing the Internet, and in addition, all English majors take two programming classes. I was therefore comfortable with the technical expertise of my students. And most of the students would be taking the class from a campus computer lab, I was familiar with their computer environment.

My first obstacle was replacing the lectures: I knew that trying to create lengthy texts would be a mistake; yet I also knew that the reading assignments were difficult and that students would need some kind of "aid" to help them understand the material. I wanted to incorporate some kind of class discussion, but I wanted to go beyond asynchronous email to include some kind of synchronous discussion. I wanted the students to be involved in their own learning and, if possible, to develop a learning community; therefore I desired some kind of collaboration. I wanted to provide some kind of way for the students to apply what they had learned, and finally, I needed to incorporate some kind of examinations to see what the students had learned.

I began with the task of replacing the traditional lectures. The reading assignments were admittedly difficult and for most of the students, this course presented them with their first opportunity to read many of the texts. I decided to develop a series of html-based study guides that would outline the main points for each author-critic. Each study guide used quotations from the readings and included explanatory notes where necessary. When I designed these study guides, [slide] I built them with three "frames": the top frame contained a header, showing the name of the course; the middle frame contained the study guide text itself; the bottom frame contained a series of three navigational buttons which allowed students to contribute to the asynchronous class discussion, to email me directly, or to access a "help" function in case they were having technical difficulty. Miscellaneous house keeping tasks were taken care of through a "News" button, accessible from the course home page, which led students to a list of course "announcements."

For course discussion I wanted to include traditional asynchronous email and each study guide contained a list of questions which served as a stimulus. I began with a listserv, but I quickly found it impractical. In its place DSU's computing services and distance education technologist helped me develop a web-based discussion board [slide]. Students were required to contribute fifty lines of text per week and they were encouraged to make multiple, short contributions. Although some students engaged in "real" discussion—e.g., "I'd like to respond to Scott's remark that . . ."—most of the students simply "dumped" their fifty lines all at once, usually late in the week or near the weekend.

Anticipating this kind of reaction, I determined to include a synchronous discussion component. I used Sixth Floor Media's *CommonSpace*, which although designed as a collaborative writing tool, has a very useful discussion module which allows for threaded, synchronous discussion. It has the extra advantage that sessions can be saved and, aside from a few minor technical difficulties, worked quite well. I set up three discussion groups, ranging in size from four to seven students, each scheduled for fifty minutes, once per week. Although this synchronous discussion modified the common notion of an Internet course as "any time, any place" delivery, I believe that this component was the major reason for the course's success. One of the most interesting discussions took place during a week when I could not log in with the class: they went along just fine without me.

To help give the students an even greater sense of community, I wanted them to get involved in their own learning and to collaborate with others in the class. I therefore placed them in small groups and assigned them the task of completing the majority of the course study guides: I completed the first three, both to get the course going and to provide models. The groups were assigned at random, with more or fewer students being assigned depending on the length and complexity of a given reading assignment. For those students who might be unfamiliar with html coding, I prepared a simple primer and placed it on the web. The student groups met via electronic mail (some even used *CommonSpace* as their meeting tool) and created the study guide text. They sent it to me via electronic mail and I posted the study guide to the course web site. This tactic had an added benefit: there was usually one student who had prepared the week's study guide in each synchronous discussion session.

To give the students a text for applying what they had read, I chose Shakespeare's *Macbeth*: it is accessible to most readers, many of the students had already read it, and it would serve as another focal point for our class discussions—e.g., "What would Plato have thought about *Macbeth*, and why?"

To ensure that the students had read Macbeth closely, and recently, I developed an on-line, html-based objective test, [slide] consisting of multiple choice (both "either/or" and "check all that apply") questions, short answer ("fill in the blank) questions, and short essay questions. This test was given during the third week of the course. I encountered technical problems creating this test, but with technical support I was able to overcome them.

To "test" what students had learned, I gave two essay examinations. To minimize the issue of "cheating," I gave the same kind of tests in Literary Criticism that I give in all of my literature classes: large, open ended essay questions for which there are neither right nor wrong answers; students may use their books, notes, and secondary sources (including the course discussion board, the *CommonSpace* sessions and the study guides) to prepare their answers. I have always preferred to test what students know and can do rather than what they may have neglected to study. Students prepared their answers using their favorite word processors and sent the exams to my via electronic mail. I read the exams, embedded comments, assigned grades, and returned the "marked" exams to the students.

As for outcomes, I believe this course was very successful: from my standpoint, I would have to say that I have never had an entire semester's class with such a sophisticated level of discussion. The student course surveys were very complimentary and both I and my colleagues have heard students enrolled in the course express their satisfaction informally to other students, perhaps the best and most honest appraisal that a course can get.

How then, do you determine what size best fits your own course? We have listed a few brief points below:

- Decide first on classroom design—i.e., how would I want my course to be taught in a "regular" classroom?
- How can I adapt that design for distance offering? For example, a lecture may be possible for a tele-course, but is that the best method of delivery, given your medium?
- Adapt the course to your audience and not the other way around. Determine your audience's technical abilities, likely "hardware" availability, educational level, and maturity. How well can your students adopt what you have designed?
- Don't be afraid of experimenting with new technology, but don't make technology the focus of your course development. Just because you know how to do something, doesn't mean that your course would benefit from your doing it.
- Don't be afraid to fail: errors and mistakes happen; they are unavoidable. It's how you recover from those errors and mistakes that's important.
- Have a backup plan. Unless it's absolutely necessary, don't depend completely on one kind of technology.
- Have the full cooperation of your campus's technical support staff.

## Autobiographical Sketches

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# A Comparison Between IVT and Resident Versions of FAA's Quality Assurance Course

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## Introduction

Research has been conducted on a regular basis for the past 50 years on the effectiveness of educational or instructional television (e.g., Finn, 1953; Chu & Schramm, 1967, 1975; Moore, et. al., 1990; Zigerell, 1984). The weight of evidence clearly suggests that there is no longer any doubt that learners can and do learn from televised instruction at least as well as they do in traditional face-to-face instruction. Over 800 studies have been identified over the past 45-plus years that compared televised instruction to live, traditional face-to-face instruction (Russell, 1992). Each of these studies has the same "no significant difference" finding. Therefore, it can be assumed that learning by today's distance learning courses delivered by televised instruction is as effective, if not more so, as traditional classroom courses.

If distance learning courses delivered by televised instruction are unquestionably as effective as traditionally delivered courses, then why are such comparisons still made? Ignoring the continuing debate on the relative use of conducting media comparison studies (e.g. Clark, 1983; Clark & Segrue, 1991; Kozma 1994, Petkovich & Tennyson, 1984), there are a few good reasons why organizations may choose to conduct media comparison studies using their own specific courses. First is the belief that each organizational environment is different from all others. For results to have organizational validity, related studies must be conducted in their own environment. Second, there appears to be an inherent distrust for data generated outside of their organization. A third potential reason is a belief that if they can show decision-makers in their organization that they have found the same results as others, the combined results may have more weight. Another reason is the need to prove to themselves that they can conduct training via distance learning technology within their organizational environment without any negative impact upon learning or the students. Lastly, they may be directed to conduct such studies to resolve a difference of opinion at the decision-making level about the relative merit, instructional effectiveness, or cost effectiveness of adopting such technology.

Virtually all of the reasons listed above influenced the FAA to conduct this media comparison study. The FAA is currently implementing and testing an interactive video teletraining capability. This study compared the effects of instruction delivered by live, interactive television to traditional classroom instruction on learner achievement and learner satisfaction. This data is being used by decision-makers, along with other information, to decide whether to proceed with full implementation of the interactive video teletraining program in the FAA.

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The FAA's Interactive Video Teletraining (IVT) program utilizes a one-way video, two-way audio, compressed digital video satellite network. The FAA studio is equipped with an Automated Instructor Presentation System which enables instructors to use numerous multimedia options to provide interactive training sessions. An interactive viewer response system facilitates instructor/student interaction and includes a questioning capability which allows all students to respond using a keypad, with responses displayed to all viewers. It also provides an audio capability between the instructor and students and between students.

## Methodology

The Quality Assurance Program Administration (QA) course was selected for this study. QA is a 7 1/2 day course normally taught in residence at the FAA Academy. It was selected based on an evaluation of the course objectives and an examination of the course activities.

### Design

A non-equivalent control group, quasi-experimental design was selected for this study. There are two distinguishing features of the non-equivalent control group design: the nonrandom assignment of subjects to treatment groups and the administering of a pretest and a posttest to both groups (Borg & Gall, 1989). This design was used due to the inability to randomly assign subjects to either treatment or control groups.

Data were collected relative to Kirkpatrick's (1994) first 2 levels of evaluation: Level 1, student reaction, and Level 2, measurement of student performance. For Level 1, all students rated a variety of items (course length, content, effectiveness, etc.) on a 5-point Likert scale from "highly satisfactory" to "not at all satisfactory." Additionally, students who received training by IVT provided their reactions on the use of the IVT technology. Level 2 evaluation (student performance) was performed by comparing pretest and posttest scores for both groups. Analysis of covariance was used to measure significant differences in performance between the students in the classroom and the students who received the training via IVT, while controlling for pre-existing group differences.

### Subjects

Two classes conducted in residence at the FAA Academy served as the control group ($N = 31$), and one class conducted by IVT comprised the experimental group ($N = 18$). The subjects were typical FAA Air Traffic Quality Assurance Specialists required to complete the QA course. These employees work at Air Traffic Control Towers, Centers, or Flight Service Stations, and ensure the quality and effectiveness of Air Traffic programs, policies, standards, and procedures.

### Instructors

The resident classes were taught by four instructors. Due to operational requirements, only one of these instructors was available to teach the IVT class, with the exception of one 30-minute segment taught by an additional instructor. The primary instructor had taken FAA's 5-day IVT Skills Course and had approximately 40 hours of rehearsal time, along with additional individual coaching provided by a specialist in IVT instruction.

### Course Conversion

The conversion process consisted primarily of updating visuals for television presentation, revising class activities and exercises for accomplishment at a distance without a local facilitator, planning and designing for interactivity, and creating student and instructor guides.

### Course Delivery

The resident control group consisted of 2 iterations conducted in residence at the FAA Academy during July and August of 1996, with a total of 31 subjects. The IVT version was conducted in November, 1996, and consisted of one iteration with 18 students distributed at four FAA receive sites. No course facilitators were used; however, proctors administered and monitored both the pretest and the posttest in order to maintain test security.

## Conclusions

### Level 1 Evaluation—Student Reaction

Students in both groups completed the end-of-course evaluation, which includes rating categories and numerical assignments of highly satisfactory (100), satisfactory (75), somewhat satisfactory (50), slightly satisfactory (25), and not at all satisfactory (0). The 12 factors rated were length of course, depth of information, pace of training, clarity of objectives, relevance to job, sequence of content, opportunity to practice, suitability of course materials, effectiveness of instructors, equipment, facilities, and overall quality. Only minor variations in ratings between the IVT version and the resident version appeared, and none were significant. The Academy has a policy of reviewing factors that drop below the "satisfactory." The IVT group rated 2 of the 12 factors slightly below 75. Course length received a mean score of 72, as some students felt the course could have been shortened. The mean score for the control group on this factor was 79. Equipment received a mean score of 73 for the IVT group, compared to a mean score of 81 for the control group. A possible explanation for the IVT group's lower rating on equipment was that one of the receive sites lost the satellite signal forcing discontinuation of the broadcast for the day. When compared to overall Academy course evaluations, all of the evaluations were high for both the IVT and the control groups. The IVT group overall rating was 83 while the control group overall rating was 88, placing both groups clearly above the "satisfactory" level.

All IVT participants answered a 10-item survey concerning the use of IVT technology. Students were asked to rate instructor/student communication, picture and sound quality, and the readability of visuals as "good," "average," or "poor." They also were asked to respond with "yes," "no," or "undecided" to questions about their comfort level in using the keypads, whether or not they got their questions answered, if they felt that the equipment performed satisfactorily, and whether or not they would like to receive other training via IVT. Overall, results were favorable toward the use of IVT technology. In each category the "good" ratings outnumbered the "average" ratings. Only one student rated anything "poor," and that was sound quality. None of the students reported that they would not like to take other IVT courses.

### Level 2 Evaluation—Test Performance

Students in both groups were given 50-item multiple-choice pretests and posttests which were open book but were proctored to ensure individualized work. The following table lists pretest and posttest means for both groups.

| | Pretest—Mean # correct | Posttest—Mean # correct |
|---|---|---|
| Resident Group | 28.08 | 48.54 |
| IVT Group | 27.50 | 48.83 |

The analysis of covariance was calculated as $F = 1.6$, $p < .21$, showing no significant differences between the groups.

## Summary

No significant differences were found between the groups on any measure. Neither student reaction nor student performance was significantly affected by the form of the presentation. The posttest mean performance scores were virtually identical. These results support a large body of similar findings which can be viewed on the Internet (Russell, 1996). This site lists 218 research reports, summaries, and papers dealing with the subject of the "no significant difference phenomenon."

The results of this media comparison study conducted within the FAA training environment confirm that conducting courses via Interactive Video Teletraining can be successful within the FAA in regard to both learner achievement and learner satisfaction. Implications for the FAA are that IVT can successfully replace a portion of current classroom instruction. Benefits to the agency are numerous and include but are not limited to the following: reduce cost of travel and per diem, increase employee access to work by reducing time away from the job, train more employees in a shorter period of time, make more training available to create a technically proficient workforce, provide better prepared instructional materials and instructors because of the open environment of television, and create higher student satisfaction due to not having to travel.

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# Urban Distance Learning: The Chicago Metro Area's First Four Years as Part of the Illinois Higher Education Telecommunications Network

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## Introduction

In less than four years, the State of Illinois developed a statewide telecommunications-based distance learning system from scratch. Today there are 272 interactive video classrooms operational on campuses from Waukegan to Carbondale, from Chicago to Macomb, and in every community college district in the state. They are at public and private colleges and universities; at two-year and four-year colleges; at high schools, hospitals, libraries and government agencies. According to the Illinois Board of Higher Education, more than 16,000 students enrolled in about 800 courses from accounting to zoology via interactive video in FY97. With the latest round of funding announced in May 1997, 102 additional classrooms will become operational this year.

Illinois was very late to enter the distance learning arena; states like Wisconsin, Minnesota, Maine, Indiana and Nebraska, have been doing it very well for years. As a latecomer, we took advantage of the latest developments in technology and chose to implement state-of-the-art compressed interactive video technology over TI telephone lines.

As coordinators for two of the ten regional higher education consortia in Illinois, we have lived through these exciting, frustrating, hectic and challenging past four years during the development of this statewide telecommunications project. The purposes of this paper are 1) to describe the Illinois Higher Education Telecommunications-Based Distance Learning Project and its history; 2) to describe the background of collaboration among Illinois higher education institutions which made this project possible; 3) to discuss obstacles and problems that had to be overcome; and 4) to present strategies for fostering collaboration among institutions for distance learning projects.

We get asked lots of questions about this project, like these: "Urban distance learning" isn't that an oxymoron? Why did Illinois get into distance learning? How did this huge network become established and operational so quickly? How do you get public and private institutions to work together, and two-year colleges, high schools, and four-year colleges? What kinds of programming are being delivered via interactive video? We will answer these questions and more, and we have lots of advice to offer other administrators who may be embarking on similar distance learning projects.

## Climate for Collaboration and Distance Learning

There are 184 public and private Illinois institutions which offer higher education courses, programs and degrees, and additional ones based in others states. With that large number, coordination and control is a very large task for Illinois's higher education coordinating bodies. Several concerns were heard regularly at public meetings: how can Illinois *avoid duplication* of low enrollment courses, degrees and programs; *reduce costs* for constructing new facilities at public universities; become *technologically competitive* with other states; and better serve the citizens of Illinois with *equitable access* to higher education?

The Illinois Board of Higher Education established a Committee to Study Underserved Areas, which produced their *Report* in late 1991. About the same time, the Illinois Community College Board sponsored a paper called *Telecommunications: A Paradigm for the Future of Illinois Higher Education* which was conceptualized by NILRC, the Northern Illinois Learning Resource Cooperative organization and endorsed by community college presidents. These two documents formed the philosophical framework and direction for collaboration and statewide distance learning.

In January 1992, the Illinois Board of Higher Education established ten regional higher education consortia to carry out regional needs assessments for higher education and training, to facilitate resource sharing and collaboration within each region, and to utilize effectively telecommunications-based instructional delivery systems which are linked at the local, regional, and statewide levels. Community college districts were used to form consortial boundaries; five consortia are in the Chicago metropolitan area and five are spread through downstate Illinois. Several regions in the Chicago area already were organized for higher education collaboration which enabled the consortia to begin this project quickly.

Fortunately, large-scale technology-based cooperative projects with public and private institutions involved as equal partners were not new to Illinois. Since 1980, higher education librarians have been operating successfully ILLINET Online, the statewide library online catalog, resource sharing and document delivery system. Many library and learning resource center directors saw the potential for telecommunications-based distance learning in Illinois, and several of them took on leadership roles within the regional consortia to get the project off the ground.

## From Theory to Reality

### "If You Build It, They Will Come"

In 1992, policy makers mandated the establishment of a telecommunications-based network and then gave us a very large carrot—$45,000,000 over three years—to put state-of-the-art interactive video classrooms on any campus that joined a regional consortium, that could prove matching investment in technology in the past, and would agree to produce and receive interactive video courses and noncredit activities. Colleges and universities rapidly joined at least one regional consortium to get in on the grant funding.

Most consortia immediately hired a coordinator or director to manage the projects and comply with grant rules and regulations; some used volunteers from a member institution until the workload became too much for any volunteer. As representatives from diverse institutions started talking to each other at consortium meetings, it was evident that something new and interesting was happening—collaboration. It was scary, expensive, innovative and, above all, founded in a deep and mutual commitment to academic excellence for all students.

### Obstacles

Some big problems became evident to us coordinators and directors. *Technical issues* with political overtones hit us right away: what equipment should we choose? where will hub site or sites be located? what institutional control will be exerted over that hub site equipment? what equipment is best for each classroom? who gets first priority for "prime time" on the network? can one institution have more "network time" than any other? who will have the technical expertise to make it all work? whom can we call for technical assistance when the system goes down?

The state didn't give us much guidance except to say that each consortium could choose its own brand of interactive video equipment from a short list of vendors recommended by the Midwestern Higher Education Commission (MHEC) and Illinois Central Management Services. The only requirement was that the equipment must be able to operate at full TI and be able to interconnect to other vendor's equipment. This was a politically correct decision to appease the powerful and influential higher education institutions who realized they never would be able to agree on a single vendor, but this decision turned out to be one we'd all regret later. As the network became established with a mix of equipment brands, each with its own proprietary software, it became clear that interconnectivity across consortium boundaries was not easy to accomplish. Yet within each consortium, classrooms connected well to each other in most cases.

Getting an *institutional commitment* from each member institution (president) to support the consortium was complicated. As time went on, the reality and complexities became apparent, such as instructional delivery in a new medium for most institutions, costs of telecommunications, and staff time for consortial activities. In some cases the technology just didn't work as well as expected, and the room sat unused. Some presidents began asking whether the cost of supporting this project was worth it for them. None said that distance learning had become a cost-effective way to deliver instruction. In a few cases, the interactive video equipment was returned or removed from a site and reallocated to another within a consortium.

Another obstacle was involving *faculty* and exciting them about teaching with this new technology. This was both the easiest, and the most difficult, obstacle to overcome. Some faculty are technologically oriented, and they saw interactive video as a way to stimulate students and to help them become better teachers. They wanted training on this new technology, then they set out to revise their course materials to accommodate television format. Some institutions gave stipends to faculty to design and teach an interactive video course. Most consortia involved teaching faculty on planning and advisory committees.

However, other faculty viewed this technology with great suspicion. They felt it was just another way the administration created to reduce the number of faculty, even tenured ones, to evaluate their teaching performance by videotaping their classes, and otherwise to intervene in their classrooms. On several campuses, the faculty union took a strong stand against interactive video instruction. We consortium directors have worked very hard to encourage and support institutions and their faculty to try interactive video teaching and to demonstrate that their fears simply did not happen. There are many more challenges ahead, and we realize that some faculty will never be convinced of the viability and academic credibility of interactive video instruction.

Student *support services,* policies, procedures and logistics needed to be established quickly. Each consortium figured out ways to deliver materials to and from interactive classrooms, to make textbooks and library services available to remote students, and to facilitate faculty-student communication before and after class.

*Programming and scheduling* issues and setting priorities for "prime time" use was worked out within each consortium, but not without some long hours of discussion and compromise. It was during these many discussions that the true nature of competition among institutions became apparent. While representatives of the institutions wanted to be polite and cooperative, it was clear that each feared and resented the possibility of losing "their" students to another institution if distance learning technology now encouraged students to take another institution's courses. Institutions would only accept courses from another institution if it absolutely, positively was not in competition with any program, degree or courses that their institution was offering (or might ever offer!).

The first institutions in the Chicago area to start using interactive video to deliver programming were 1) community colleges who were already sharing and reciprocating courses, 2) institutions with multiple branches who began delivering their own courses to their own students at different branch campuses, and 3) 4-year and graduate schools who brought upper-level and degree-completion course work to community college campuses. Later, low-enrollment courses, such as foreign languages and advanced science and math, were seen as good courses for collaboration between institutions. As high schools were added into the interactive video network, some community college courses were delivered to high school students, and graduate teacher education courses were delivered to high school teachers after school.

### Advice From Two Consortium Directors

- Make sure the equipment is easy to use, and that it works well, every time, all the time. Nothing turns off students, faculty, administrators more than equipment failure. Have a Help Desk for technical assistance at all hours the network is in use. Train technical staff and nontechnical staff to troubleshoot the equipment.

- Provide leadership and coordination of all aspects of the project. Make sure that the leader's vision is shared with all. The consortium director model has worked well in Illinois's ten regions.

- Find a "cheerleader" at each institution who will jump into the opportunity that interactive video technology presents, and who will encourage others at the institution to try it, too. We found that institutions who are without someone to champion interactive video are underutilizing the technology and are not expanding and improving educational opportunities for students. Support, encourage and reward those cheerleaders at the institution and consortium level.

- Train faculty, staff, administrators and anyone else who wants to use interactive video technology. Training sessions may be short operational lessons, two-day mini-teaching lessons, or intensive instructional design workshops or courses.

- Use the technology. Have meetings over the network. Encourage administrators to use the classrooms for videoconferencing. Bring in students to "play" with it and teach other students. Have faculty meet with other faculty in their discipline over the network. Encourage local businesses, government agencies, non-for-profit groups to use the classrooms during off hours.

- Manage the competition among institutions. Build trust and collaboration will follow.

- Accept the fact that distance learning is not a replacement for traditional courses, not everyone will like taking classes this way and it is generally not cost-effective. Distance learning can be an effective way to expand course offerings, to increase student enrollment, to save time for students who may attend class at a closer or more convenient location, and to make educational opportunities more accessible to place-bound students.

- Evaluate your progress. If you don't have time to plan, at least step back and reevaluate your progress on a regular basis and make adjustments accordingly.

- Communicate, communicate, communicate.

## Autobiographical Sketches

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# NET.WORK.VIRGINIA: Forging New Partnerships in the Information Age

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In the past year, Virginia Tech has worked to facilitate new partnerships by offering its constituents connectivity and educational opportunities through NET.WORK.VIRGINIA, the Commonwealth's new statewide, broadband network. Cooperative efforts between a variety of organizations were crucial to the start-up and maintenance of this innovative project. Such collaborations create enhanced instructional possibilities, as well as a new set of challenges, for providing higher education in the Information Age.

## Technological Partnerships

Colleges and universities throughout Virginia have been seeking alternatives to satellite-delivered distance instruction because of its inherent limitations. In recent years, the availability of transponder time for educational purposes has dropped drastically, due to failed satellite launches and a sharp increase in commercial demand. Also, because of its synchronous nature, satellite programming constrains its users to time and place-bound educational opportunities. In addition to constraints on student participants, distance education providers are also affected by this non-scalable delivery mode. Since many of the Commonwealth's colleges currently operate their broadcast classrooms at maximum capacity, growth in course offerings means the necessary construction of additional origination facilities, an expensive, and sometimes politically challenging, endeavor.

In response to the need for a new approach to distance education delivery, NET.WORK.VIRGINIA was developed through a highly competitive RFP process. Virginia Tech, in partnership with Old Dominion University and the Virginia Community College System, developed a contract with Bell Atlantic and Sprint to provide universal access to advanced digital communications services for education in Virginia. The asynchronous transfer mode (ATM) network has very high capacity and can deliver interactive voice, data, and video services. A usage-insensitive pricing structure was created so that users could take advantage of network services twenty four hours a day, seven days a week. Overcoming the barriers of synchronous-only delivery options, a single connection to NET.WORK.VIRGINIA can be used to support different types of activities, such as two-way videoconferencing, asynchronous Internet-based instruction, and interactive multimedia applications.

In the spring semester of 1997, five pilot sites began testing the network with limited for-credit course offerings and experimental activities. Virginia Tech, New River Community College, Blue Ridge Community College, the Northern Virginia Graduate Center, and Old

Dominion University served as a state-wide test-bed for ATM technology by exchanging technical expertise, problem solutions, and research outcomes. This collaborative effort helped to quickly evaluate network reliability and facilitated the rapid implementation of NET.WORK.VIRGINIA into a functional delivery system for many users.

To date, over 100 sites have purchased connectivity to the statewide network, representing a variety of constituent areas. Participants include nine major universities, three private colleges, 11 public school systems, seven Cooperative Extension centers, 41 community college campuses, 38 state government offices such as the Department of Health offices, the Library of Virginia, the Department of Transportation, and the Department of State Police.

## Instructional Possibilities

The advent of NET.WORK.VIRGINIA has provided extensive educational possibilities and partnerships for distance education. Because the network supports a variety of instructional activities, offerings can be customized to meet the needs of program participants. Synchronous applications include multi-casting, two-way videoconferencing, and alternative conferencing methods which utilize audio interchange, application sharing, and shared graphic space. Asynchronous programming can be delivered through Internet-based courses, as well as video on-demand. Instructional developers at participating institutions are exploring these delivery modes to determine their suitability for the variety of curricula and activities which need to be supported.

Pilot activities primarily tested the network's capability for two-way videoconferencing. Faculty extension specialists at Virginia Tech had an immediate need to offer one-day short courses to agents and agricultural consultants in the Shenandoah Valley. Blue Ridge Community College offered their facilities as the remote site and provided technical support to ensure the success of the workshops. Planning is underway at Virginia Tech to provide the video course materials from these sessions on-line so the information will be accessible to the public.

### New Programming

The variety of new programming efforts reflects the diversity of NET.WORK.VIRGINIA participants. Virginia Tech has received requests from various organizations for the development of graduate programs in Instructional Technology and Electrical Engineering, Virginia Cooperative Extension teleconferences and workshops, credit and non-credit continuing education activities, and certification programs in Gerontology and Food Services Management. Network users are interested not only in receiving programming, but in originating some of their own instructional events. In a support role, Virginia Tech offers technical and instructional development staff to promote understanding of network operations and potential applications.

### Existing Programming

In addition to developing new educational opportunities, Virginia Tech is currently working to transition existing satellite-based programming to network offerings. For example, the Commonwealth Graduate Engineering Program, a consortium program from Virginia's four primary engineering universities, has been delivered by satellite for over 15 years. Participating sites include graduate centers, corporate and government workplaces, and other universities. Representatives from each stakeholder group are collaborating to re-think the manner in which this program could be delivered. Options range from group-based, two-way interactive video or desktop systems to self-paced modules would allow students to work through course content at a time and pace that is convenient for them. Under this model, student-teacher and student-student live interactions could be facilitated through desktop conferencing, web-based interchanges, and e-mail.

## New Challenges

While NET.WORK.VIRGINIA offers many benefits to its users, this new delivery mechanism for distance education also poses many challenges--technical, instructional, and political.

### Technical Challenges

Since ATM technology is relatively new, vendors of "end user devices" such as teleconferencing systems and streaming video server technologies are scrambling to develop new products which are compatible with this networking system. Such rapid changes in product development make for difficult purchasing decisions, especially with limited state funding.

Because of the wide variety of technologies which can be utilized for distance education purposes, each participating site must consider multiple variables when making distance technology decisions. Will the site's investment be a result of local programming needs or will it be driven by the media and methods which external program providers choose? Who is responsible for ensuring that all participants can support such varied activities, especially with a large diversity of remote site types, from small corporate settings to large government networks and everything in between? Out-of-state sites pose a different challenge because the contract for NET.WORK.VIRGINIA is applicable only within the Commonwealth.

### Instructional Challenges

Since changing technologies offer an opportunity to re-think teaching methods, instructional development staff have an obligation to work with faculty in exploring possible innovations. Simply moving traditional instruction to another delivery medium fails to leverage the power of these new digital learning tools. Faculty development opportunities are essential to the success of distance program development.

Students are also challenged by new approaches to learning. Learners could be expected not only to manage course content requirements, but also to interact effectively with new learning technologies and to accommodate a variety of instructional strategies. Students will need to accept a greater sense of responsibility for their own learning outcomes, and in doing so, will need clear objectives and a seamless support system for instructional and logistical assistance.

### Political Challenges

With a connection to NET.WORK.VIRGINIA, anyone can be an instructional provider. As the competition increases and coordinating bodies debate the efficacy of redundant program offerings, different policies are being developed by different providers regarding what courses can be offered to which constituents. If a course or program is deemed acceptable by a receiving institution, for example, where do students enroll and to whom do they pay tuition? If tuition rates differ, which rate do they pay? Some receive sites are charging external providers an hourly fee for the use of their videoconferencing classroom facilities. Overcoming policy differences such as student enrollment status, varied tuition rates, and restrictive access fees will require on-going communication between network users, as well as a commitment to collaboration for the benefit of the Commonwealth's learning community.

## Autobiographical Sketches

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# Flexible Delivery of Continuing Professional Education: Models, Issues, and Trends

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## Abstract

The rapid growth in flexible delivery of open learning and teaching through the use of interactive communication technologies poses significant questions relating to resource allocations, different learning environments, more demanding time constraints and new modes and techniques of communication. Current practice regarding continuing professional development programs indicates that little has been done to provide an appropriate conceptualisation of flexible delivery or open learning, particularly in the distance mode, reflecting sound educational principles and contemporary design elements to maximise learning outcomes using interactive communications technologies. Evidence collected to date indicates that design and delivery of professional development programs, as well as ways of meeting adult learning principles, are different when new interactive communications technologies are applied. This paper will address the issues inherent in this problem, provide examples of ways in which new models are addressing the issues as well as present what appear to be trends in such delivery.

## Pressures

The 20th Century is closing with a build-up of pressures on every organisation whether it be industry or service oriented. These pressures may be listed as:

- Economic (income vs expenditure)
- Equity and social justice
- Technological
- Deregulation
- Improved productivity and quality assurance
- Global competitiveness

All professionals face challenges with regard to continuing professional development, 'lifelong learning', which is crucial for the survival of competitive organisations today. Indeed, all of these pressures, of course, require continuous updating of the whole workforce not just professionals, including managers. Therefore, these pressures are as relevant to education and training providers as they are to commercial enterprises of all sizes.

The challenge for all providers, whether they be internal to the organisation or external providers tendering for contracts, can be summed up as follows:

- To establish new corporatised operations as public (ie government tax-based) funding is withdrawn

- To provide 'just-in-time' training
- To deliver into the workplace or the home
- To design programs which meet new quality standards
- To customise training for the particular client, both in terms of the organisation and the individual learner
- To enter into partnerships to ensure accreditation and articulation towards higher qualifications
- To achieve economies of scale
- To employ flexible delivery modes using a range of technologies
- To compete in the global market place

## Types of Professional Development

Professionals are addressing the needs for professional development in a variety of ways:

- Networking and mentoring in collegial ways using a range of synchronous and asynchronous communications technologies
- Self reflection and keeping journals to ensure improvement in practice
- Action learning through a series of cycles, including team processes through planning, action, reflection and refinement of action
- Benchmarking and quality assurance mechanisms, again through networking and open management styles and devolution of responsibility
- Establishing the learning organisation in which constant upgrading of skills and practices through learning becomes a major ingredient of the culture of the organisation

## Flexible Delivery and Flexible Learning

The Australian Technical and Further Education (TAFE) National Flexible Delivery Working Party (1992: 47-48) has also provided a clear definition of 'flexible delivery' which can be taken as the basis for any approach to open learning and flexible delivery.

Flexible delivery is an approach to vocational education and training which allows for the adoption of a range of learning strategies in a variety of learning environments to cater for differences in learning styles, learning interests and needs, and variations in learning opportunities. There are two main categories of communications and information technology relevant to flexible delivery:

- Distributive
  - Postal services
  - Broadcast radio
  - Broadcast television
  - Narrowcast radio or television
  - Simulcasting

- Interactive
  - Telecommunications-based interactive communications and information technology such as teleconferencing (audio, audiographic and video, both interactive satellite video and compressed videoconferencing)

- Computer-mediated communication(CMC), both real time (synchronous) and delayed (asynchronous), such as email, bulletin boards, computer-text conferencing, listservers, file transfer, access to databases and so on, increasingly through the Internet
- In-house workstation or computer-based Interactive Multimedia (IMM) systems, including laser disk and CD- ROM systems, increasingly features of Intranets

These flexible delivery technologies, each has specific hardware requirements. The evidence available suggests a convergence of technologies that should be a factor in planning for educational applications of technology. Increasingly, information is being stored and transmitted in digital form. At the same time, there is a convergence of computing and communications technologies, leading to computer based devices that function as desktop (or portable) computers, but with a multimedia capability that can carry out the functions of a telephone, fax machine, audio system and TV.

## Models for Professional Development

The main concern about developing effective models is that they should primarily be about improving the quality of professional adult learning. Indeed, the use of technologies is no longer limited to distance education but they are being used in a wide variety of ways to share teaching and learning (Smith and Kelly, 1989), educational expertise, resources and research in all educational and training settings. These options go beyond the traditional notion of distance education (Barker, Frisbie and Patrick, 1989; Daniel, 1996; Garrison, 1987; Lundin, 1992).

### The TeleSLAQ Model

In 1983 the School Library Association of Queensland (SLAQ) initiated a series of teleconferences for the professional development of its members. The first programs were by audioconference but since 1984 there have also been a number of Interactive Satellite Television programs, i.e. one way video with two-way audio.

With regard to the structural level a five part model was developed from the beginning to keep teleconferencing within a context:

- Pre-conference materials (printed book, audio or videotape)
- Pre-conference discussion at local sites (1 hour)
- Teleconference (1 hour)
- Post-conference debriefing and evaluation (1 hour)
- Taped copy of the conference and booklet sent to those who could not attend live

The TeleSLAQ Model has been used successfully with several professional groups including teachers, principals, nurses, podiatrists, psychiatrists, engineers and accountants.

An extension of this model has now become possible with the use of the Internet. Pre-teleconference and post teleconference discussion can now be held online both synchronously (Internet Relay Chat) and asynchronously (Forums). Furthermore, videoconferencing is used to bring into the satellite programs guest speakers from interstate as well as overseas. These being added to the live satellite program with telephone and fax interaction now provides a powerful 'interactive multimedia' model which applies all the technologies appropriately according to their attributes.

### The ELIC Model

Another example of a professional development program using satellite television was the 11 week Early Literacy Inservice Course (ELIC) for elementary school teachers. It also is an excellent example of using the appropriate media in a cost-beneficial way.

With regard to the structural level, the ELIC course provided, first of all, a printed workbook for each of the 11 units. These workbooks contained all the directions for processes and content. The combination of using the print, audio teleconferencing, satellite video and local group discussion is set out below:

- 15 minutes: each group meets at the local site to share, read and discuss coursebook materials
- 15 minutes: each group has an audioconference with its tutor
- 45 minutes: satellite television program, 'Skytalking'
- 15 minutes: local group discussion
- 30 minutes: each group has an audioconference with tutor

A variety of internal designs were used during each section of the session to ensure participation and interaction to fulfil the various objectives. These include working in pairs, taking notes, whole group brainstorming, formulating questions, answering questions, undertaking workplace activities between programs and so on.

### The 'Victor Kiam' Model

This is the name I have given to large scale Interactive Satellite Television programs which have featured such people as Victor Kiam, Peter Drucker and Edward de Bono. The structural design again is different from the ones above and catered for 200 or more sites with up to several hundred people at each, with a total audience sometimes of 15,000 to 20,000. The day might typically be organised as follows:

| | |
|---|---|
| 9:00 am | Local site introduction to processes and morning coffee, distribution of materials (eg a book by the key presenter) |
| 10:00 am | Live, interactive satellite television transmission, with scenarios/case studies, a brief presentation, then questions by telephone and answers from the presenter(s), usually organised by attendants at each site collecting questions written on cards by members of the local audience |
| 12 noon | Lunch and local speaker at each site |
| 2:00 pm | Live, interactive satellite television transmission as above |
| 4:00 pm | Local activity |
| 5:00 pm | Close |

These programs are usually on a subscription-by-site basis. That is, for a fee, the site is enabled to receive the program. Then, in turn, the local organisers 'resell' the seats to local participants and retain any profit gained. This model's greatest strength is in the economies of scale that are gained. A similar model over half a day using audioconferencing on a 'meet-me' basis has also been observed with health care workers.

## Future Issues, Trends, and Unanswered Questions

Future predictions usually fall short of reality both in terms of actual developments and the pace of change. The major areas that will impact on flexible delivery of professional development are associated with:

- Changing role of the provider
- Globalisation
- Deregulated climate for advanced education and telecommunications
- Compulsory continuing professional development
- Increased technological options
- Virtual learning

With regard to globalisation, in addition to institutional consortia mentioned above, it is increasingly possible for providers to transmit both synchronous and asynchronous education/training programs anywhere in the world. The globalisation of the virtual university or the international virtual higher education market place has some exciting potential, but there are also several issues to be considered in putting it all together. Questions that may be asked include:

- How will learners determine the quality and authenticity of such programs?
- How will credit be obtained for subjects taken from another country?
- Who will the teaching staff belong to if they are teaching through another institution?
- Who will the students belong to?
- What are the regulatory and cultural implications of the globalisation of education?

At best, this globalisation will provided new opportunities and access where little or none previously existed; at worst it will result in educational invasion.

Increased technological options, especially through the convergence of modes of communication onto the Internet, indicate that all of the above areas of development will expand exponentially. This, plus the increased miniturisation of computer technology, the increased flexibility of computer use, the personalisation of communication contacts and the personalisation of search engines, will make it possible for adults to tap learning just-in-time from sources anywhere in the world to meet life and work needs as they arise. This type of virtual or 'feral' learning will not necessarily have any overall sequence or plan and educational institutions will be challenged in terms of learners fronting up for recognition of prior learning. The learner, whether professional adult or young child will be able to say: 'I am my school' or 'I am my university'.

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# Distance Higher Education Policies in Europe: Cooperative and Competitive Approaches

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## Abstract

This paper will provide an overview of policies relating to distance education at higher education level in Europe. Transnational cooperation in distance education is a key objective in European Union programmes, nevertheless, there have been few examples of substantive cooperative transnational teaching programmes. To a certain extent, national priorities and competitive interests may conflict with the ideal of transnational cooperation. This papers will examine the factors promoting or inhibiting cooperation and competition in the European distance education market. In this context the role of technology and the debate on the globalisation process will be considered.

## Open Distance Learning in Europe

Open distance learning (ODL) is the term favoured by the European Union to describe a form of education which involves the use of technical or non-technical methods to replace the presence of a teacher; to increase the flexibility of learning, in terms of space, time, choice of content, or teaching resources; and to improve access to education for those who are prevented for locational, occupational, or domestic reasons or the lack of intervening educational opportunities from accessing other forms of education. One key difference between distance education in Europe and in the United States is summed up in a phrase 'Europe reads while America watches'. The main medium used in Europe to date has been print, whereas there is significantly greater use of satellite and computer based communications in US distance education.

Open distance learning at higher education level has existed in Europe in various forms since the nineteenth century; by the 1980s, distance education systems were established in most European countries. Because of the wide variation in national educational policies; socio economic conditions; demographic characteristics and geographical conditions, different organisational models have been adopted. Open Universities were established in the United Kingdom, the Netherlands, Germany, Portugal and Spain with the objective of teaching adults solely through distance education; in other countries conventional universities provide education to both on-campus, and to off-campus students (the dual mode system); whereas others have adopted various forms of consortia involving a number of universities and institutions cooperating in the development and delivery of distance education programmes (for example the National Distance Education Centre in Ireland). In some countries all three models are in operation.

The European Association of Distance Teaching Universities (EADTU) was established in 1987, and currently has a membership of eighteen institutions, drawn from fifteen countries; almost 500,000 students are enrolled on programmes offered by EADTU institutions in 1996/97 (EADTU, 1997). The European Study Centre network now comprises almost fifty registered sites in fourteen countries. A number of other networks were established in the 1980s such as SATURN and Eurostep, however these initiatives failed to survive.

As will be shown in this paper, distance education in Europe has been characterised by both cooperative and competitive approaches, sometimes with the same institutions cooperating on research and development projects, while competing with each other nationally, or internationally for market share. The Open Universities dominated their national markets for distance education when they were established, however, they are now facing competition from the dual mode institutions which are taking advantage of the flexibility offered by the new technologies. In addition, distance education consortia have enabled the smaller countries to develop substantial programmes by facilitating cooperation between universities which normally compete with each other for students and funding.

## European Union Open Distance Learning Policies

The European Union (EU) has played a substantive role in promoting cooperative approaches to open distance learning among its member states; Articles 126 and 127 of the Maastricht Treaty (which came into force in November 1993) provide the legal framework requiring the Community to take cooperative actions aimed at improving quality in the field of education and training. Indeed, ODL is specifically referred to in Article 126. The SOCRATES programme, launched in 1995 includes an action programme aimed specifically at providing funding for transnational ODL projects. ODL is seen as a key factor in enabling citizens of Europe to take advantage of an open area for educational cooperation in Europe—indeed according to the guidelines attached to the SOCRATES programme 'ODL must be embedded in national education systems whether at school or university level'. ODL is of particular interest because of its potential to provide cost-effective education and training to individuals across the Community; it can move courses rather than learners across borders; and it can more easily exploit the potential for international cooperation than other forms of education.

To illustrate how the EU has arrived at this position, I will briefly outline the background to the development of EU policy on distance education. The European Union emerged from the need to reorganise and cooperate after the devastation of the second world war. The Treaties of Rome were signed by France, Germany, Italy, Luxembourg, Belgium and the Netherlands in 1957. The main aim of the treaties was to allow the six countries to work together towards integrating the members into a single community; developing closer relations between member states; and harmonious development of economic activities. The Treaty allowed for freedom of movement of goods, workers and capital across the six countries. Ireland, the UK and Denmark joined in 1973; Greece in 1981; Spain and Portugal in 1986; and Austria, Finland and Sweden in 1995. The fifteen member states are likely to be joined by more members from the former East European bloc who have applied to join.

While the Treaty emphasised economic cooperation, no reference was made to education or training, and it was not until 1973 that education was brought within the European framework, specifically within the areas of language teaching; mutual recognition of qualifications, and permanent education. In 1973, education was included with Research and Science Policy as a concern of Directorate General XII. In 1976 the Council of Ministers from the member states agreed a basis for Community action in education which led to the introduction of a range of programmes aimed at supporting the European dimension in education.

Official EU interest in ODL could be said to have started with the presentation of a report by Mrs Winifred Ewing, to the European Parliament in May 1987 on open universities in the community. In July 1987 the European Parliament adopted a resolution on open universities in the European Community calling on the Commission to follow a number of guidelines in the field of distance teaching, mainly making use of existing Community programmes such as ERASMUS, COMETT and DELTA. In May 1990, in response to an initiative from the Irish Presidency of the Council, the Council of Ministers for Education discussed the aims of distance education and training in member states and the initiatives possible at Community level. A national experts group was convened to advise the Commission on priorities and their advice was incorporated into the *Memorandum on Open and Distance Learning in the EC* in 1991 (CEC, 1991b). The *Memorandum* outlined the policies and actions at institutional and member state level needed to put ODL on a secure footing in the community.

According to the *Memorandum* ODL has the potential to increase the level of entry qualifications into the workforce; update and upgrade the entry qualifications into the workforce; provide advanced training and dissemination of research results; strengthen education/training infrastructures in less developed regions; to create transeuropean networks; consolidate partnerships among states, institutions, and industry; support education and training in emerging countries in central and eastern Europe; include the European dimension in existing courses; teach about the European Community (law, institutions, policies); and improve the quality of education.

What is interesting about the *Memorandum* is its emphasis on the need for coordination and cooperation in ODL: to give ODL standing and structure; to maintain standards and quality; provide counselling, tutorial and interactive support; to recognise credits and qualifications. Among the strategies it recommended were the formation of institution/enterprise partnerships; formation of consortia to deliver ODL courses; clarification of financing policies in member states so that the disadvantaged should be able to participate in ODL courses. However, despite the emphasis on cooperation, the *Memorandum* still supports the concept of an open market in ODL 'products' stating 'it is important that local structures and support facilities for students should not be tied to local or national producers in such a way as to inhibit the operation of such a market' (CEC, 1991b).

Since 1991, EU support for ODL has been enunciated in a series of reports, Green Papers, and White Papers on a range of topics. There is a growing acceptance of the links between growth, competitiveness and education and training. The potential of the information and communications technologies (ICTs) for delivering education and training and for modernising and transforming traditional education is routinely cited. For example, the Green paper on *Living and Working in the Information Society: People First* (CEC: 1996b) recommends that the information and communications technologies (ICTs) should be integrated with education and training. It points out that 'there is a need for Europe to develop a new architecture of life long education and training, involving all parts of the education and training systems including schools, and designed and delivered in more appropriate ways' (75).

The SOCRATES programme is the most recent programme for providing funding for European wide initiatives in all forms of education. According to Mme Edith Cresson, European Commissioner: 'to construct the Europe of tomorrow, it is obvious that we must invest in education today. SOCRATES is a key component in the European Union's strategy in this regard. By promoting European cooperation and helping to improve the quality of education through partnership across national boundaries, the programme can make an important contribution to developing the full potential of Europe's human resources and to furthering the emergence of a modern and humane society in which all citizens can play a full and meaningful part' (CEC, 1996c).

## European Cooperation in ODL

The SOCRATES ODL action provides funding for transnational projects which focus on one or more of four objectives: facilitating cooperation between organisations and institutions in the field of ODL; enhancing the skills of teachers, trainers and managers in the use of ODL techniques; improving the quality and user-friendliness of ODL products; encouraging the recognition of qualifications obtained through ODL. The stated purpose of these projects is to achieve greater synergy and exchange of experiences and resources at the European level through working on collaborative transnational projects which must involve partners from at least three countries.

While detailed evaluation of the outcomes of the SOCRATES programme remains to be done, some interesting patterns are emerging from an analysis of applications for funding in 1995–1996 (TAO, 1997). Of the 251 applications submitted, 73 have been successful (29%). The main objective of the projects which have been selected is to transfer ODL expertise from existing systems to institutions which have not provided ODL courses before. For example, the OUUK is involved in one project whose aim is to deliver OU courses to the Universities of Hamburg, Vienna and Bologna. In most projects, the emphasis is more on integrating ICTs into conventional education, than on expanding existing ODL programmes.

Larger countries with the most developed distance education systems tend to submit the greatest number of applications; for example, the UK submitted almost one third of applications overall, whereas smaller countries tend not to submit any. Generally, the programme seems to have stimulated a range of cooperative networks; some projects having up to eighteen partner institutions. In terms of who cooperates with whom, it has been noted that organisations from France, Germany and to a lesser extent the UK tend to cooperate with neighbouring countries, whereas Greece, Portugal and Finland, Norway, Austria tend to cooperate with more distant countries. Nevertheless, the UK, France, Spain and Italy tend to feature in a wider range of partnerships, whereas other countries such as Germany and the Netherlands tend to be quite restricted in the number of countries with which they cooperate.

The SOCRATES programme is confined for the moment to EU members, Liechtenstein, Iceland and Norway. However, the PHARE Multi-Country Programme in Distance Education is an EU initiative to promote the integration of the east European countries into the European Union through European wide cooperation in education and training. In addition, the TEMPUS programme also supports partnership projects between east and west. A range of West European institutions providing ODL programmes have participated in projects aimed at supporting the development of ODL in the former communist countries.

For example, the National Distance Education Centre in Ireland has provided training the trainers workshops to groups from Czech and Slovak Republics and has hosted visits from Slovak academics as part of a Tempus project.

It should be noted that while networks have been established, nevertheless, despite the substantial investment of funding, there are few examples of transnational projects which continue once funding stops, whereas national consortia, which do not receive European funding continue to survive.

### Competition in ODL in Europe

So far I have discussed the emphasis on cooperative approaches to distance education in Europe. However, as was mentioned above, cooperation and competition are taking place side by side within and between the same institutions. Indeed, some European distance learning institutions have adopted quite aggressive competitive approaches to internationalising their operations. For example, John Daniel, Vice Chancellor of the OUUK points out that so far 'distance education systems have been organised within national borders . . . not invented here protectionism can still be rationalised and camouflaged by appealing to the importance of cultural appropriateness in education. . . . The geopolitics of the 1990s challenge distance education to abandon parochialism' (Daniel, 1992: 20–21). The OUUK is now a multinational operation with over 6000 students in Europe following its decision in 1991 to recruit non-resident students. Ireland is its largest foreign market, comprising almost half of its non-resident students. However, most of the courses presented by the OUUK in Ireland are not in direct competition with Irish National Distance Education programmes, and there is evidence that when presented with a choice between similar courses, Irish students opt to take their degree from an Irish university.

Transnational competitive activities are not universally welcomed. In responses to the *Memorandum on Higher Education* (CEC, 1993) concerns were expressed by the smaller countries, such as Denmark, Ireland and Portugal about the possible detrimental effects of a dominant position being accorded to large open universities. It was felt that these large universities would not reflect the cultural diversity of Europe and that over-standardisation and domination by the larger providers in the context of a free market for open and distance education would ultimately damage national cultures (CEC, 1993: 46). While there is 'remarkable willingness' to engage in international cooperation there is no support for the idea of a 'European Open University' (CEC, 1993: 47).

Of course, competition comes not only from other European states. Because of advances in new technologies, it is now feasible for institutions located in the United States and Australia to move into Europe and recruit students. Evans (1995: 258) cites the Australian Open Learning Agency as an example of an organisation 'mutating into its post-Fordist form as its global enterprise expands, especially through computer mediated communications. Recently OLA has established, using print, television and computer communications, networked activities from Russia, through Eastern Europe and into South East Asia'. Recent large scale surveys of EU citizens show substantial support for protecting the Union from non-European competition; 57% of those questioned feared for the survival of small and medium enterprises (CEC, 1996a). The fear is that as the 'shop on the corner' is disappearing under the invasion of the big multinational retailers, so the 'university down the road' may give way to some 'globalversity'. We will turn to the issue of globalisation in the next section.

## Globalisation

There has been much debate in distance education literature about the implications of the globalisation process for distance education since the early 1990s. While some commentators regard this debate as somewhat academic, others point out that national and international policy makers are guided by paradigms which in turn influence what learners learn, and therefore, distance education must be considered in the wider socio-economic context (Campion, 1995: 195).The pressures which are leading to the growth of globalisation and international interdependence include the growth in international trade; the increasing role of multinational corporations; the growth of an increasingly global capital market; the effects of technological change and transfer (Marquand, cited in Campion 1995: 201–2.) These pressures tend to weaken national autonomy, yet as we will see below, education remains very much an area where national autonomy persists.

According to Giddens, 'Globalisation is not only, or even primarily, an economic phenomenon; and it should not be equated with the emergence of a 'world system'. Globalisation is really about the transformation of space and time. I define it as action at a distance, and relate its intensifying over recent years to the emergence of means of instantaneous global communication and mass transportation (Giddens, 1994: 4). The new technologies are inextricably linked to the globalisation of the world economy. The media and communications companies are now truly global industries. Because, for many commentators, ODL and new technologies are seen as synonymous, it is suggested the distance learning will spearhead the globalisation of the education market. 'The trends towards globalising of knowledge and the spread and scattered expertise in specialised fields can only be met by the use of systems enabling a potential universal access' (CEC, 1994a: 17).

### Barriers to Globalisation of Open Distance Learning

However, the ethics and viability of a globalised distance education system have been questioned. Hawkridge points to the threats to national systems posed by the potential of the 'new superhighways' to create the 'big bang' in distance education. 'The Big Bang would clearly add to the dangers of domination of distance education institutions by multinational interests who own the super highways. . . . Every day, Rupert Murdoch and his ilk are buying into the means of production and distribution of knowledge. Is it too fanciful to think of large national open universities being denationalised within a decade? Will they be sold off, privatised? With the large enrolments, steady demand and efficiencies of scale, would they become rather profitable, given a power launch on the superhighway? (Hawkridge, 1995: 9). It is in fact doubtful if this scenario could be realised. The Open Universities and indeed most ODL higher education institutions rely to varying extents on government funding to subsidise their operations. It is difficult to envisage acceptance of full cost fees in countries used to free or low cost education. What would be more likely is the hiving off of high profile courses with profit making potential, such as management courses, which might in turn damage the financial viability of the remaining programmes.

Moore notes that different technologies can have different effects on the relationships between poorer and more technologically advanced countries. The use of satellite technology serves to promote homogenisation and globalisation of the communications environment, and perpetuates the control of technologically advanced countries over poorer countries, whereas interactive computer technologies may serve to break this social and economic control. He concludes that we need to research 'what are the international obligations regarding distance education of the technically advanced countries' (Moore, 1995: 38).

Another barrier to globalised distance education systems is the fact that education remains firmly rooted in national policies, and has proved resistant to the globalising trends which have altered other services—the broadcast media for example. Even the European Union is prevented from interfering with national education policies by the principle of subsidiarity. As Field points out 'In its thinking on open distance learning, the Commission was clearly attracted by its potential in supporting growth and competitivity, then. Its agenda precisely followed a post-Fordist analysis of Europe's economic predicament' (Field, 1995: 276).

Cultural differences also serve to frustrate globalisation of distance education. In Europe, the market is highly differentiated because of differences in language, culture, national policies, and legislation. (Field, 1995: 277). While English is widely spoken, and English language distance education systems have a built in advantage over others, nevertheless the language barrier should not be underestimated. While course developers and managers may be able to understand English, these skills are not universally shared by potential students, or indeed the administrative and clerical workers in the institutions. Some large scale producers such as the OUUK are translating their courses into local languages, however, this can be an expensive procedure, and the numbers involved must be large enough to warrant the costs of translation. The high demand courses with a significant transnational appeal lend themselves best to translation.

Education is seen as a medium of transmission of national cultural values. For example, in a major European survey of 65,000 people in the fifteen member states of the EU, 57.8% thought education was an area where decisions should be taken at national level, whereas only 37% thought that such decisions should be taken within the European framework (CEC, 1996a). There is resistance to homogenisation of local cultures; there is a fear that economies of scale will require the destruction of local variations. Yet technology may facilitate the concept of flexible specialisation whereby educational 'products' may be tailored or customised for local markets. The kinds of courses which are most likely to be successful are those where the transnational element provides added value, or where cultural issues do not arise, for example, management, marketing, engineering, information technology, or languages.

## Conclusion

Evans (1995:266) suggests that 'future forms of open and distance education should not be seen as matters of 'access' or 'invasion' into others' spaces and territories, but rather as an open dialogue or interaction between the participants. This requires both resisting the pressure to 'homogenise' and also valuing diversity. The development of contemporary open and distance education in the context of an increasingly global society is intimately connected with international marketplace ideologies. Therefore, we can see that educational institutions' policies and practices are formed . . . by the current 'discourses' of educational commodification, production, marketing and consumption.' Nevertheless, the attitude that education and training is a public good dominates national policies in Europe. Universities and other higher education institutions have not yet fully accepted that education can or should be traded as a commodity or like other services. There is substantial resistance to homogenisation in education, and a high regard for cultural diversity. In fact, this diversity is often cited as a comparative advantage. However, there is no guarantee that this attitude will prevail, in view of the increasing competition in the European market from some large institutions both from Europe and externally.

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## Autobiographical Sketch

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# Developing Accessible Distance Learning Instruction for Special Needs Students in Education and Industry

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## Session Objectives

The objectives of this presentation are to:

- Show how instructors can use their content expertise to develop Distance Learning courses which will be accessible to a wide variety of audiences, including those with disabilities or those whose second language is English

- Show how to stimulate learner interaction and collaboration among each other and with the instructor

- Explain what kind of technology is required by the school/institute and by students to implement this type of instruction

- Demonstrate how this type of any time, any place education/training can benefit special needs students in education and in industry

## Content Abstract

Specific Course Design/Implementation: At the National Technical Institute for the Deaf (NTID) two professors have developed DL instruction which is accessible for a wide range of students, including deaf and hard-of-hearing, students whose second language is English (i.e. foreign students) and students with other disabilities. A certificate program of three courses is being developed which will allow students to learn C++ and HTML computer programming. These courses were developed by Don Beil and James Mallory respectively.

The two C++ courses use videotaped instruction which includes sign language, closed captioning, graphics and cartoon-based animations. The students interact with each other and with the professor on electronic bulletin boards. Executable programs, previously compiled, are available for students to copy from the faculty member's account. Students get programming assignments in two different formats. First, the program requirements are written in English and posted on the electronic bulletin boards. Secondly the executable program can be downloaded by the student and run, so the student sees exactly what their program is supposed to do via actual interaction.

The HTML course is independent instruction developed almost entirely on the WWW. Students can select the particular day or lesson which they would like to view and that day's assignment is clearly described with text, graphics, and pictures movies. This is not merely links to other home pages, it is direct instruction. Students are able to type in their HTML code in the left hand column of a page and the corresponding result would appear in the right hand column. The lessons start with rudimentary HTML programming and progress towards more advanced concepts. All assignments are submitted on the WWW.

The above courses are developed specifically with deaf and hard- of-hearing students in mind. Any instructions written in English are written at a lower level and many supplemental graphic and animated examples are used.

Both courses follow RIT's quarterly schedule. They use the same RIT facilities that the traditional students use, including the book store, the bursar, registrar, etc. DL students to have a central distance learning office which takes care of their special needs, but otherwise they are treated just like any other student at the university.

This presentation will describe the two courses mentioned above and break them down into functional modules. These separate modules include:

**C++ Course**

- Videotape
  - Sign language
  - Graphics
  - Captioning
  - Animations
- Executable examples
- Use of instructor world—readable directories
- Electronic bulletin boards & conferencing

**HTML Course**

- WWW
  - Lectures
  - Assignments
  - Homework submission

Each module will be analyzed in terms of its effectiveness and the positives and negative aspects for both faculty and students. The ease and feasibility of implementation of these courses at any college will be discussed, including the issues of budget and equipment limitations, demands on faculty member's time, etc.

The population that these courses are offered to will also be discussed, and how this type of instruction fills a void which exists for DL instruction for deaf, hard-of-hearing and special needs students.

## Autobiographical Sketch

**James R. Mallory** is an associate professor at the Rochester Institute of Technology (RIT), in the college of the National Technical Institute for the Deaf (NTID). He has worked with deaf, hard-of-hearing, visually impaired and other special needs students since 1982 in a variety of majors and technical topics in education and in industry. Prior to 1982 Mr. Mallory was a project Engineer for Mobil Chemical Co., Macedon, NY. Mr. Mallory has an M.S. in Computer Science and a B.S. and A.A.S. in Electrical Engineering Technology from RIT and

Kent State University, respectively. Mallory has consulted in the areas of training and professional development for companies such as Kodak and Xerox. Mr. Mallory has numerous publications and presentations in the fields of Technology, Computer Science and Deaf Education. Mr. Mallory implemented a remote-based Distance Learning (DL) class for deaf students during the 1996-1997 academic year, and is actively pursuing DL instruction for deaf and special needs students in education and in industry.

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# Providing for Professional Development in Instructional Technologies Using Distance Education

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## Abstract

Technologies and techniques used in distance education and multimedia instruction are becoming critical to faculty working in both technological and traditional teaching/learning environments. This project was designed to train faculty in technologies and techniques used in distance education and multimedia instruction. A series of workshops were delivered via WONDER (full-motion video and two-way audio) to faculty and staff on several UW-System campuses: La Crosse, River Falls, Stout, Eau Claire, Milwaukee, Superior, and Stevens Point, with Eau Claire serving as the origination site.

The workshops delivered instruction via distance education and exposed faculty and staff to technologies which enhance instruction in both distance education and traditional courses. The program series broadened instructor ability to deliver instruction in the most appropriate and effective ways allowing them to make informed decisions about pedagogy and implementation.

The curriculum for these workshops included using presentation graphics, gopher, email, the World Wide Web, and discussion lists in instruction, and how to use scanning, clip art, music, CD-ROMs and other available instructional hardware and software (e.g., digital cameras, image enhancing software like Adobe Photoshop and Freehand) in building instructional materials. Issues of copyright, interactivity in instruction and the future of distance education are also key parts of the workshop series' curriculum.

This series of workshops is jointly funded by the Wisconsin Educational Communications Board, and the offices of Academic Affairs and Information Technology Management at the University of Wisconsin—Eau Claire. The workshop series was kept in quad-split mode with four campuses served each semester. The spring 1996 series served 73 faculty and staff while the fall 1996 series served 48. An on-campus pilot held prior to the WONDER series included 12 Eau Claire faculty/staff; therefore, the total participants served by this professional development activity was 132.

Formative evaluation efforts included instructor critique of videotaped sessions, on-line assessment at the midpoint using the World Wide Web pages created for this project, and a comparison of survey data between this group of on-line faculty and staff as compared to survey results from an on site pilot of this project held one semester earlier at Eau Claire.

## Curriculum Description

The curriculum for this series evolved to meet the needs of the participants and of the facilitating staff. In the fall of 1995 a pilot series was run at the UW—Eau Claire campus for 12 faculty members on 4 full Saturdays. The curriculum used in this pilot was examined and adjusted to provide the curriculum for the first ECB run of workshops, 8 Saturday mornings, in the spring of 1996. The curriculum for the fall of 1996 evolved from this series, with some change, but not significant change. Largely, the instructional staff decided to use the principles of design and instruction instead of a specific software package (e.g., Astound!). Further, as the technology itself evolved, so did the use of it in the modeling of the presentations through the series (e.g., from Gopher to Java, etc.).

### Session #1: Overview—Working in a Distance Education Environment

This opening session features hands-on experience with the technologies used in two-way audio, two-way & full-motion video distance learning classrooms. First, some of the myths of distance education will be discussed and some of the research being done in the field will be available for participants at their registration site. Several perspectives of distance education will be discussed at this kick-off session.

### Session #2: Using Presentation Graphics to Enhance Instruction

Some principles of instructional design will be featured in this session that discusses learning styles and some strategies for including every learner in the distance education classroom. Many of the principles featured in this session are directly applicable to traditional classrooms as well as they focus on interactive teaching and learning. The three levels of multimedia and presentations software will be discussed and demonstrated.

### Session #3: Netscape, WWW, Telnet

After a review of the basics of the World Wide Web, the presenters will highlight strategies for integrating the WWW and Internet resources. Issues related to working with the Internet in the DE environment (like what do the students have access to) will be covered along with ideas of how to minimize the challenges. A faculty member from UW—Eau Claire's Department of Mathematics will demonstrate how he uses the WWW in his instruction, including Java applications.

### Session #4: Scanning, Importing and Incorporating Visuals in Instruction

In this session, scanning sounds, images and texts for use on the WWW or in preparing other instructional materials will be featured. Design issues and theory will be applied to capturing and editing images, still and moving, from CD's and the Web.

### Session #5: Discussion Lists, Chats, Moos, Mudds, News

In addition to the World Wide Web, the Internet provides many other opportunities for you and your students, including computer-mediated communications. During this session the use of discussion lists, chats, moos, mudds, and news will be covered, including strategies for integrating them into your curriculum, how to locate the resources and what the requirements are for the each resources.

### Session #6: Technology and the Learner

In this session an education specialist and a technology specialist work together to exploit technology to motivate learners from all styles. Multiple intelligences, learning abilities and styles, and the where, when and what to use of the technological options & features of this workshop.

### Session #7: Copyright, Case Studies From Faculty On-Line

Electronic publication has challenged copyright law. In this session, case studies of faculty working in the electronic world of publishing and teaching are offered via videotape, phone and in-person, to a copyright lawyer who will address the copyright issues in each case. A forum for discussion of the many issues of copyright is the core of this session.

### Session #8: The Future of Distance Education for Wisconsin

In this informative session, distance education coordinators from each of the participating campuses will report on what is going occurring on each of the respective campuses with regard to distributed learning practices, policies, and activities. How distance education is becoming a focal point in the UW-System, as well as at other institutions, is the core of this workshop.

### Participants

| | | |
|---|---|---|
| *Fall 1995 (Pilot):* | | |
| UW—Eau Claire | 12 | |
| *Spring 1996:* | | |
| UW—Eau Claire | 20 | |
| UW—La Crosse | 13 | |
| UW—River Falls | 14 | |
| UW—Stout | 25 | |
| | 72 | (spring) |
| *Fall:* | | |
| UW—Eau Claire | 20 | |
| UW—Milwaukee | 19 | |
| UW—Superior | 6 | |
| UW—Stevens Point | 3 | |
| UW—Barron County | 0 | |
| | 48 | (fall) |
| *Grand Total:* | 13 | |

**Evaluation**

[Key: 1 is the low point , 7 is the high point]

| *SP96* | *FA96* | *Overall* | |
|---|---|---|---|
| 5.4 | 5.1 | 5.25 | Overall, I find the delivery system is compatible with my learning style. |
| 6.6 | 6.2 | 6.40 | Distance education is an effective delivery medium for instruction. |
| 4.7 | 4.7 | 4.70 | I can learn as effectively using this delivery system as I can in a hands-on, on-site, laboratory classroom or training center. |
| 6.1 | 6.8 | 6.45 | The delivery system has made it possible for me to learn something that otherwise would not have been possible at this time at my institution. |
| 5.9 | 6.2 | 6.05 | I look forward to learning again in this mode of delivery. |
| 5.1 | 5.7 | 5.40 | I can see images on the video monitor/large screen without difficulty. |
| 6.0 | 5.8 | 5.90 | The duplicated materials are useful in my learning the content presented on line. |
| 6.1 | 6.5 | 6.30 | The modeling of distance education methods and strategies is effective. |
| 6.3 | 5.9 | 6.10 | The instructors' voices are clear and distinct as they come over the system. |
| 5.3 | 5.5 | 5.40 | The voices of participants at other sites are clear and distinct as they come over the system. |
| 4.6 | 5.1 | 4.85 | I would like to see more time devoted to instructor/participant interaction. |
| 5.6 | 5.7 | 5.65 | I like the 1:00–3:30 p.m., Saturday, timeslot for the workshops. |
| 5.8 | 6.4 | 6.10 | Overall usefulness of the series |
| 5.0 | 6.2 | 6.00 | Overall quality of the series |

## Issues and Conclusions

As is true with all distance education endeavors, it is critical to plan well ahead of events, and to collaborate, communicate and cooperate. All of these issues become even more important when working across institutions with different missions and purposes. A single person, in charge of the entire programming, is critical, but can only be effective with the direct assistance of many others. For this endeavor, a site coordinator/facilitator, chosen well in advance of the program made all the difference between success and failure.

Further, it became an added benefit, rather than a negative, to have different participants participating in different ways across institutions. For example, a fifth site was added to a quad split just after midway through the programming. This provided a challenge to rise to for the technical staff, and it provided direct observation and participation for the participants at the five sites to directly experience the difference between compressed video and full motion video. Professional development, then, became an issue not just for the participants (largely faculty), but for the support staff (facilitators) and technical staff as well.

Finally, one of the lessons learned from this program was that professional development in a distance education environment becomes an issue not only for the target audience, but for everyone involved. Teaching and learning is about learning all of the time—to teach is to learn. Therefore, in preparing for and delivering professional development in instructional and information technologies by using them, everyone learns, all the time, together. What a wonderful paradigm!

## Autobiographical Sketches

**Susan R. McIntyre** is an Associate Professor in the Department of Curriculum & Instruction at the University of Wisconsin—Eau Claire. For the past two years, she has served as half-time Coordinator to the Center for Instructional Technology & Innovation, a university initiative to assist faculty and instructional staff across the campus to effectively use more technology in undergraduate and graduate teaching and learning. McIntyre is the 1995 recipient of the Chancellor's Excellence in Teaching Award at UW-EC and a 1986 winner of the Lieber Outstanding Teaching Award at Indiana University where she earned her doctorate in Language Education in 1990. Her more than one dozen articles and chapters focus on learning strategies, reading and literacies, and using instructional technology to enhance learning.

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**Kathleen S. Finder** is a Technical Training & Documentation Specialist with the McIntyre Library. Working closely with the Center for Instructional Technology and Innovation (CITI), Finder works with faculty and staff to help build and expand their information technology skills and integrate technology into the curriculum.

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# Staff and Faculty Development for Agricultural Distance Learning Programs at the Collegiate Level

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## Introduction

Providing formal and informal educational opportunities to learners at distant sites presents staff and faculty with many challenges related to planning, organizing, and delivering instruction. Applying the traditional classroom teaching model to distance education generally yields disappointing results. Batey and Cowell (1986) noted that advances in educational and communications technology had outpaced the advance of educational ideas and procedures. This phenomenon continues to be true as colleges and universities direct disproportionate amounts of effort and resources to technology when compared to staff and faculty development.

Clearly, a need exists for faculty development opportunities in distance education. Considering this fact, a joint proposal involving Iowa State University, Alabama A&M University, and Arkansas State University was written for the 1995 USDA Higher Education Challenge Grant program. The proposal entitled "Advancing a Model for Faculty Development in Agricultural Distance Learning" was funded for $152,000 by the Cooperative State Research, Education, and Extension Service, US Department of Agriculture, Higher Education challenge Grants Program, under agreement No. 95-38411-2510.

## Methods

The central feature of this project involved the development and delivery of five, two-hour satellite programs. Three programs originated from Iowa State University, one from Arkansas State University, and one from Alabama A&M University. Distance learning experts were recruited to assist in the development of the programs and as presenters during the programs. The experts worked with the project directors and staff to develop example programs that model effective distance teaching methods and dealt with important issues and concerns identified by faculty in a needs assessment.

The needs assessment was used to identify the themes and topics of each of the five satellite programs. The needs assessment was conducted in January of 1996. Sixty-one academic deans and 88 staff and professors from 70 different colleges and universities participated in the needs assessment process. After the data were analyzed and summarized, the project directors met to establish program topics and issues. The five areas to be addressed were: Focusing on the distance learner, Planning for instruction at a distance, Presenting instruction for distance learning, Developing innovative multimedia presentations, and Models of effective distance teaching.

The first program, Focusing on the distance learner, included a presentation of what is known about learners and learning at a distance. Also, a panel of agricultural distance learners was utilized to interact with the host and participating faculty about issues of concern to distance learners.

The second program, Planning for Instruction at a distance, dealt with a variety of instructional planning issues ranging from the formulation of realistic instructional objectives to developing distance teaching materials.

Program three was entitled, Presenting instruction for distance learning. This program addressed the do's and don'ts of distance teaching, the use of a variety of teaching methods, active learning, and emphasized methods for getting the most out of the distance education medium.

Developing innovative multimedia presentations was the topic for program four. This program addressed current and future applications of computer multimedia technology for distance learning. The use of the internet and web-based instruction was featured.

The last program examined Models of effective distance teaching. A panel of successful agricultural distance educators were assembled to interact with the host and the faculty participants. Videotaped vignettes of these educators at work were used to illustrate instructional practices.

Promotional and application materials were sent to all academic deans and agricultural education department heads in colleges of agriculture across the United States. The cost of satellite uplink fees was shared by all institutions at a rate of $600. per institution. Faculty and staff from thirty four institutions participated in the project. Staff from institutions receiving the program made arrangements to receive the broadcasts and to recruit participants from their institutions. A site facilitator was selected by administrators at the respective institutions.

A key ingredient of this project was communication between and among all participants throughout the span of the project. To accomplish this task three forms of electronic media were employed: an electronic newsletter, a web site, and a web board. Information about each broadcast and all handout materials were made available through the project web site.

The newsletter was called *Connection: Your connection to faculty training for agricultural distance learning*. Initially, this newsletter was printed and mailed to potential participants. After polling the participants, the decision was made to publish this newsletter on the web in electronic form. To view the newsletter, participants used Adobe Acrobat. A link to the newsletter was provided from the project web site.

The project web site included more specific information regarding the project as well as links to other distance education resources. The address for the web site is http://www.ag. iastate.edu/departments/aged/connection. The web site became an extraordinary useful tool for delivering the handouts related to the project. The experts contributed additional information and links to other resources. Their presentations were also made available at this site.

The third communication tool was a web conferencing tool. This tool functions differently than e-mail. Participants could log on to the site and take part in virtual discussions regarding the topic of each presentation. They could post questions or comments and anyone could respond. This program was superior to normal e-mail in that participants could chose when and if they wanted to participate rather than being bombarded with all comments as they would be using LISTSERV. The web conferencing tool was also linked to the project web site.

Site coordinators were asked to organize and promote each program. The programs were delivered on five consecutive Tuesdays from 1:00 PM to 3:00 PM in February and March, 1997. The site coordinators were asked to make a telephone or internet connection available at each session. Participants were encouraged to interact with the experts and hosts during each broadcast. Each satellite broadcast was videotaped. Institutions which experience problems receiving a particular broadcast were sent a tape. Immediately after each broadcast, site coordinators conducted brief discussions with the participants. An evaluation of each program was also conducted.

## Results

The average number of participants at each session was 172 at the 34 different sites. Most participants utilized one or more of the forms of communication made available to them. Most participants attended all five sessions. Site coordinators conducted discussions after each broadcast at about one third of the sites. The project generated a tremendous amount of interest from the participating institutions. Faculty and staff from diverse departments and disciplines participated. There were few problems in receiving the broadcasts, but some sites reported audio interference.

The popularity of the project and the level of participation is attributed to the fact that many states are developing distance education systems to deliver instruction. Most of these systems consist of live, two-way, compressed video systems utilizing fiber optics telephone lines. Most faculty were also interested in web-based instructional systems. These faculty are preparing to offer distance education opportunities via the internet.

The web site and the web conferencing board proved popular among the participants. The use of electronic media greatly reduced the costs of printing and postage to the project. Participants could choose what they wanted to print. The web conferencing board also allowed participants to interact without constraints of time, time zone, and toll charges. The experts monitored the web board and were able to address the specific needs of participants. In addition, the participants could interact during each broadcast.

The most popular method of communicating with the experts during a sessions was via the telephone. A live call-in format was utilized which enable all participants to hear the question or comment being proposed. Some participants preferred the web board for their questions.

## Summary and Conclusions

Distance education technology is rapidly becoming available to colleges and universities. Attention should be given in preparing faculty and staff to take full advantage of this technology to do an effective job in teaching at a distance. It is increasingly apparent that whatever form of distance education is used, interaction must be provided. Compressed video systems are currently being used or being developed to offer distance education in real time. However, the internet is emerging as a medium to offer distance education opportunities in real time or delayed. In addition, the internet provides a means to make information available to people when they need it. Systems of interaction must be developed for the internet to become an effective medium for distance education.

## Reference

Batey, A., & Cowell, R. N. (1986). *Distance Education: An overview.* (ERIC Document Reproduction Service No. ED 337 081.

## Autobiographical Sketches

**Wade Miller** is a professor of agricultural education at Iowa State University. He is professor-in-charge of the Brenton Center for Agricultural Instruction and Technology Transfer. This center houses the College of Agriculture's distance education classrooms which are connected to more than 600 sites in Iowa via the Iowa Communications Network. The center also houses the College's Off-Campus degree programs office. Dr. Miller has worked at Iowa State University for 17 years preparing high school agriculture science teachers. He has had extensive experience in distance education.

**Greg Miller** is an assistant professor of agricultural education and studies at Iowa State University. His research interests focus on distance education in rural and agricultural settings. Dr. Miller has conducted a number of studies in distance education and has developed several model faculty development programs and guides. He is the Project Director of the project from which this paper was developed. Dr. Miller has worked at Iowa State University for five years. He works in teacher education and teaches research methodologies. Dr. Miller is recognized by his colleagues as one of the authorities on distance education at the collegiate level in agriculture

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# Distance Education Collaboration Across Indiana: The Indiana College Network

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## Introduction

The 90s have seen expansion and transformation in Indiana distance education. Students taking classes at more than one institution, using more than one delivery method, face problems and complexities which did not arise in a more monolithic earlier environment. The Indiana Partnership for Statewide Education, established by Indiana university presidents in 1993, brings together the distance education courses and services of seven state universities and their regional campuses—Ball State University, Indiana State University, Indiana University, Ivy Tech State College, Purdue University, University of Southern Indiana, and Vincennes University—as well as Indiana's independent institutions. It exists to provide Indiana residents greater access to undergraduate, graduate, and professional continuing-education programs at a distance by enhancing cooperation and coordination among universities in the state in providing student services and information about distance education. This presentation describes the Partnership concept, shows how student service functions are handled inter-institutionally, and delineates the information services of the Partnership as provided on the World Wide Web (http://www.ICN.org).

Through a statewide network of learning centers, students can take classes close to home with the added convenience of nearby support services, such as first-contact counseling, admission, registration, communication services, test proctoring, library services, and contact with on-campus offices. Many students who take classes at their place of work, a public school, or a library can visit a nearby learning center for support services rather than traveling to the campus where they are earning their degree. In addition, a unique student service center's toll-free number provides first-contact college and career information as well as calls forwarded to specific institutions when helpful.

## Building the Partnership

The collaborative effort known as the Partnership developed within an existing consortium, the Indiana Higher Education Telecommunication System (IHETS). IHETS provides voice, video, and data services to Indiana's universities and colleges; its satellite network allows Indiana institutions to send televised courses with two-way audio communication to nearly 350 receive sites located in the state's universities, public schools, libraries, hospitals, and businesses. The Partnership promotes and coordinates undergraduate, graduate, and continuing education offerings not only of satellite-delivered courses but also of courses delivered in a variety of other media. These media include videotape, the Internet, and the recently inaugurated interactive video network serving Indiana University's main and regional campuses. With IHETS' Indianapolis offices as a central meeting place, the

Partnership has worked through IHETS staff and a group of committees to elicit cooperation and collaboration by the member institutions. Each institution's dean of continuing studies (or parallel position) serves as a member of the principal coordinating body, the Partnership Working Group.

In 1993, the Indiana General Assembly mandated that Indiana institutions work together to develop a beginning 30-credit-hour core program of courses that would transfer among all state institutions. The Partnership saw distance education as a way of delivering such lower-division courses across the state. To assure transferability, the identified courses were reviewed by statewide faculty committees. While credit mobility remains an issue of great interest, the Partnership's catalog and database of courses incorporate a host of other undergraduate and graduate-level distance education courses that enable students to pursue associate's, bachelor's or master's degrees.

To allow students to take classes off-campus from more than one institution and still receive financial aid, the Partnership Working Group developed the *home institution model:* the home institution is the location where the student's records are maintained and where the student can pursue a degree. At the end of the semester, grades are sent from the temporary files of the *originating institution* (the college or university where the class is taught) to the home institution.

## Collaborating and Cooperating in Student Support Services

Looking to ease entry into lower-division undergraduate work for new and nontraditional students, the Partnership struggled with the problems of access to seven state institutions with many different enrollment systems and student support services. The following student support services are the result of cooperation and collaboration by representatives of the Partnership institutions.

### The Class Schedule

A combined Schedule of Classes is produced twice a year, in fall and spring/summer editions. This catalog contains information about distance education participation, descriptive class listings, university profiles, listings of on-campus and learning center contact information, and data sheets that can be used for admission, registration, and course changes. The original student information sheet was intended to be accepted as the only form a student would complete to begin taking college courses. Not all university admissions offices would accept this document alone: through negotiation, it evolved into a data sheet that could either be accepted for admission or used as an initial contact with an admissions office. A course-change document was included as it became imperative to keep official dates of classes dropped off-campus.

### Campus and Learning Center Coordinators

The Working Group first assigned the role of campus coordinator of Partnership activities on each university campus in 1994. The campus coordinator's role is to be the single on-campus contact for off-campus students. S/he enrolls students, sends out syllabi and course information, and handles grades at the end of the course. Students can contact the campus coordinator for reaching instructors or on-campus services and troubleshooting class issues. Campus coordinators meet regularly to share information and resolve problems.

The learning centers of the Partnership are in most cases located on college and university campuses; a few at other public-sector sites such as libraries serve special regional needs, especially in the more rural southern part of the state. At each learning center, a coordinator provides support services for all distance education. Learning center coordinators help support class interactivity by providing Internet services, telephoning on-campus offices, faxing, surface mailing, and primary academic counseling. They make university materials available and ensure that equipment for viewing classes is functioning and ready.

Both groups of coordinators meet regularly to resolve issues that affect their role and duties. The campus coordinators announce and describe developing programs and classes, keeping learning center coordinators equally informed. The groups share information by means of a common electronic discussion list. Many coordinators are long-time university administrative staff, who have developed a rapport and an open approach to dealing with problems between institutions.

### Statewide Student Services Committees

Several of the inter-institutional administrative committees of the Partnership have addressed student services concerns collaboratively. The Marketing Committee has been closely involved with the design of the catalog and other informational materials. Through the Advising and Placement Committee, academic advisors from the institutions have collaborated to build a grid that shows transferability of undergraduate courses. After an arduous process of collecting and verifying information, the grid will be available to campus and learning center coordinators this summer. The advisors are also planning test sites for a common computer-based placement test, the College Board's Accuplacer assessment program, to be used at selected learning centers. A third group concerned with student services, the Library Services Committee, seeks to address distance education students' research needs. In response to this group's request, each university has designated a librarian as the contact for distance education students' concerns.

### Textbooks and Course Materials

The collaborating institutions saw a centralized source for textbooks as an attractive possibility and worked to achieve coordination in this area. However, those schools with established distance education programs already had long-standing arrangements for textbook ordering and found themselves duplicating their efforts or confusing programs where texts had been included with course materials mailed out throughout the semester. The dream of centralized ordering evolved into a request that the student either buy books on campus or order through each campus' mailing procedures. In this case, then, the spirit of collaboration proved best served by an agreement that each campus' prior textbook arrangements be honored.

### Student Service Center

A unique feature of Indiana's Partnership for Statewide Education is the Indiana College Network Student Service Center. Services provided include a toll-free number staffed to respond to inquiries about the "Indiana College Network," the name under which the Partnership institutions' distance education courses are jointly marketed. Indiana College Network catalogs and promotions prominently feature this number, which receives hundreds of calls monthly. First-contact counseling is available from trained phone staff, and often students are referred to Partnership institutions' offices for additional information. Because the Center is also a large database depository for career information, nontraditional students can receive many answers with one phone call. By contractual agreement, the Indiana Career and Postsecondary Advancement Center (ICPAC) fulfills the Student Service Center function.

The Student Service Center is also the central clearing house for students wishing to take classes. By faxing the catalog's information sheet to the Student Service Center, the student initiates admission and registration activities. The Center then distributes the forms to both originating and home institution coordinators. Course-change ("drop and add") forms are also designed to be faxed to the Student Service Center.

## Electronic Information Resources

Electronic information resources are available to Indiana's distance education students through the Indiana College Network web site, expressly designed to meet student information needs. This site has its own domain name but is resident on the Web server of the Indiana Higher Education Telecommunication System (IHETS) and is closely linked to that organization's site. The site addresses three key questions of distance education students: What can I take? How are classes offered? How do I begin? Resources designed to answer these questions are available in several categories:

### Databases and Lists

A comprehensive database of course information accessible from the Web includes information on all courses offered by the Partnership institutions via all distance delivery methods. Students and others can search the database by institution name, discipline, semester, etc. The database supplies the data for the printed catalog and serves as a record of each semester's classes. Another database allows students to locate satellite reception sites around the state by criteria such as town, county, or site access policy. Complete lists of campus and learning center coordinators provide contact information including their electronic mail addresses; a clickable county map is available to give students quick information about nearby learning centers. A list of Internet service providers in Indiana allows distance education students to find providers offering dialup access in their locality.

### Links to Institutional Sites

To put students in touch with resources at Partnership institutions, a student enrollment information directory provides links to admission, financial aid, and advising information for institutions generally and also for specific degree programs. Another page provides access to electronic directories at all the Partnership institutions offering that services, allowing students to look up contact information such as phone number or electronic mail address for faculty or staff members. From another page, links lead to the library Web sites of the member institutions and to a list of librarians who serve as contacts for distance education students. Still another page supplies links to the universities' continuing education or distance education Web sites.

### Publications and Other Distance Education Information

An on-line version of the current ICN Schedule of Classes can be opened, printed, and searched directly on the ICN Web site, as can a booklet of available undergraduate degree programs. Adobe Acrobat is the format currently used for these on-line publications. A selection of several dozen syllabi for Indiana College Network courses is also available for students' review. Materials that help orient new or potential students to higher education, distance education, and the concept of the Indiana College Network include a Glossary developed expressly for the site and more extensive information about ICN and about the Student Service Center.

### Planned Additional Resources

A long-term goal of the student services committees is to seek university on-line admission and registration procedures that can be available to all learning centers, increasing efficiency and reducing the current complexity of the paper flow. It is also hoped that financial aid can be adapted to the needs of distance students taking courses from more than one institution. In electronic information development, the ICN Student Information Form will appear as an interactive document that students can complete on the Web site and that will be routed from the site to a database at the Student Service Center by mid-July 1997. By mid-August, the ICN Web site will include links to a collection of streaming Internet video materials that will include "clips" of distance education classes accessible in Streamworks format via the Web. It is also expected that during the summer of 1997 a grid of course transferability will become available for use by advisers and, ultimately, distance education students.

## Autobiographical Sketches

**Nancy Millichap** (BS in Education, Shippensburg University; MA, Middlebury College) has worked with computer applications, networks, and information resources in higher education for eleven years. After eight years providing faculty computing support at Dartmouth College, she joined the staff of the Indiana Higher Education Telecommunication System in 1994 and is now its assistant director for user and information services.

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**Ann Holcombe** (BA in Speech Communication, Purdue University; MSEd in Instructional Systems Technology, Indiana University) has worked for the past eight years in higher education delivery systems and new/returning adult student services at Indiana University-Purdue University Indianapolis (IUPUI); she also served as IUPUI Campus/Learning Center Coordinator for the Indiana College Network. As learning services coordinator with the Indiana Higher Education Telecommunication System, she brings campus and learning center coordinators together to resolve common issues and maintain strong cooperative communication.

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# An Evaluation of a Collaborative, Location-Neutral Course Design

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## Introduction

The primary purpose of this project was to evaluate a distance education course design with respect to educational effectiveness. Specific objectives of the project were a) identify the demographic characteristics of the learners, b) identify differences in student achievement among the Distance and Traditional groups while statistically controlling for prior knowledge, and c) identify relationships among instructional design and learner satisfaction with learner achievement.

The instructor was initially concerned with the perceived lack of instructor-student interaction possible in the distance education setting. Working with the instructional designer, the instructor estimated that in a typical week of on-campus delivery comprised of three 50 minute lecture sessions, as much as 30 minutes were spent in instructor-directed question and answer activity. Additionally, a weekly lab exercise was determined to be essential to the mastery of the instructional objectives. An important discovery for this instructor was the idea that the majority of the lecture sessions, fully two hours per week, were not interactive, and were simply the presentation of information.

The full team met to address these issues. The team reviewed the instructional objectives of the course, and discussed how each might be accomplished over distance. It was decided that a combination of technologies would be used to create an active, "location neutral" learning environment. By location neutral the team meant to ensure that the students have an equally good learning experience regardless of location.

Three sections of this redesigned course were offered in the spring semester of 1997. The "traditional" on-campus section met three times a week for 50 minutes. The design agreed upon for distance delivery included weekly two-hour videotapes (three 40 minute segments) of the instructor's presentations. These replaced the lecture presentation portion of the weekly lecture sessions in the on-campus section. An on-site laboratory and facilitator were arranged at the remote site to duplicate exactly the laboratory experiences of the on-campus students. Weekly hour-long interactive videoconferencing sessions were scheduled. The intent was to double the amount of time devoted to the question-answer sessions in the on-campus section. A notes packet and study guide were printed to supplement the course text and presentations. Course materials were made available over the World Wide Web. To support both student-student and instructor-student interaction computer assisted telecommunications using e-mail and chat software packages were organized. On-campus students could enroll in either the "Traditional" three lecture section or in the "Local" distance delivery section while students at the far site were restricted to the "Distance" delivery model. Since the labs were identical in either case, this effectively gave us three sample groups with which to work.

Previously learned knowledge and skills must be accounted for when attempting to measure current learning. During the first week of class, students received a pre-test to determine their existing level of competency on course objectives. Two course evaluations were completed by students, one in the first quarter of the term and the other at the end of the course. These evaluations were used to determine student perceptions of the effectiveness of course delivery. Subject matter exams were used to provide data on achievement. In addition to the pre-test, four exams were given, three during the course, and a final.

A non-equivalent control-group design was used to summarize the data collected from student evaluations and test scores. In addition to descriptive statistics, analysis of covariance statistical procedures were used to address concerns of internal validity, ensuring that any group differences found on the measures of achievement were not due to preexisting group differences rather than to course design. The correlation of ranked scores on the course evaluations with success in the course was measured in an attempt to identify possible early indicators of necessary interventions to improve learner success.

## Findings

Of the 108 students who enrolled in the course, 91 cases were retained in the sample analyzed. Ten students from the Distance delivery section, and two from the Traditional withdrew prior to the midterm examination and were therefore excluded. Five students in the Traditional delivery section failed to complete and submit the required Statement of Informed Consent, so their data was excluded. The relatively high withdrawal rate from the distance section was partially explained through contacts with students who had withdrawn. They indicated that they were poorly advised to enter the class without having taken the prerequisites. Their early experience in the class had convinced them the prerequisites listed in the course catalog were in fact necessary, and so they withdrew until such time as they could prepare themselves for success in the course.

Of the 91 students retained in the sample, 64 were male and 27 were female. Their median age was 22 years. Broken out by class standing, there were 34 Seniors, 41 Juniors, 15 Sophomores, and one Freshman. These descriptive statistics for gender and age are reported in Table 1 and Table 2.

**Table 1: Group Frequencies of Gender and Median Age by Location/Method**

| Group | Males *f* | Females *f* | Age *Mdn* |
|---|---|---|---|
| Traditional | 52 | 22 | 25 |
| Local | 6 | 1 | 21 |
| Distance | 6 | 4 | 28 |

**Table 2: Group Frequencies by Academic Standing**

| Group | Freshmen<br>*f* | Sophomore<br>*f* | Junior<br>*f* | Senior<br>*f* |
|---|---|---|---|---|
| Traditional | 1 | 9 | 37 | 27 |
| Local | — | — | 2 | 5 |
| Distance | — | 6 | 2 | 2 |

How did the students perform? The overall average score was 76.71. The individual scores ranged from 32.00 to 99.75. The group means for achievement by method, and the associated 95% confidence intervals are reported in Table 3.

**Table 3: Mean Achievement by Location/Method**

| Group | *M* | *N* | *SE* | 95% CI |
|---|---|---|---|---|
| Traditional | 76.43 | 74 | 1.75 | 72.94–72.92 |
| Local | 76.93 | 7 | 4.03 | 67.05–86.81 |
| Distance | 78.65 | 10 | 4.41 | 68.76–88.64 |

As indicated by the overlapping confidence intervals, the researcher was unable to detect any difference in achievement due to either teaching method or the location of students. Due to the small sample size of the distance delivery groups and the extremely unbalanced design, statistical inference beyond this class is not recommended. While the mean score of the Distance group was 2.22 points higher than the mean score of the Traditional students, this difference was not statistically significant, and in the opinion of the researcher, lacked any practical significance as well. While larger sample sizes and a more balanced design might be able to detect as statistically significant variations of this magnitude in the means, they would nonetheless lack practical application to the improvement of instruction.

The group means for achievement by gender, and the associated 95% confidence intervals are reported in Table 4.

**Table 4: Mean Achievement by Gender**

| Group | *M* | *N* | *SE* | 95% CI |
|---|---|---|---|---|
| Males | 74.24 | 64 | 1.85 | 70.61–77.87 |
| Females | 82.58 | 27 | 2.37 | 77.93–87.23 |

The confidence intervals suggested a T-Test for the equality of means be conducted. Levene's test for the equality of variance was run and found not to be significant, therefore equal variances were assumed. A t-score of 2.57 was calculated. With 89 degrees of freedom this yielded a probability of .0116 that the difference found was due to chance. Females were more likely to achieve a 8.34% higher score in this class. This constitutes almost a letter grade, and is a significant finding.

The group means for achievement by academic standing, and the associated 95% confidence intervals are reported in Table 5.

**Table 5: Mean Achievement by Academic Standing**

| Group | *M* | *N* | *SE* | 95% CI |
|---|---|---|---|---|
| Freshmen | 85.0 | 1 | — | — |
| Sophomore | 72.2 | 15 | 3.25 | 65.85–78.61 |
| Junior | 77.6 | 41 | 2.22 | 73.21–81.91 |
| Senior | 77.4 | 34 | 2.72 | 72.09–82.76 |

Here again the researcher was unable to detect any relationship between academic standing and achievement. While the mean score of the Sophomores was 5.4 points lower than the mean score of the Juniors, this difference was not found to be statistically significant.

The data were then tested using analysis of covariance procedures to statistically control for previous knowledge as indicated by the pretest. No significant differences were detected.

In addition to the demographic variables and the measures of academic achievement, a categorical variable called "Eval" was created from the course evaluation students completed during the first quarter of the semester. Written comments were categorized into one of three groups reflecting a student's perception that measured on their ability to learn this class was Better (3), the Same as (2), or Worse (1) than other classes the student had taken. The frequencies are reported in Table 6.

**Table 6: Frequencies of Early Course Evaluations**

| | Location/Method | | |
|---|---|---|---|
| Response | Distance | Traditional | Local |
| Worse | 2 | 16 | 1 |
| Same As | 4 | 34 | 3 |
| Better | 4 | 24 | 3 |

The overall mean of the early course evaluation was 2.13, indicating that the average student felt this class was as effective as other classes they've taken.

Spearman's Rho Correlation coefficients were then calculated for all the variables. The data are reported in Table 7.

**Table 7: Spearman's rho Correlations**

| | Score | AGE | CLASS | EVAL | PRE | SEX |
|---|---|---|---|---|---|---|
| Score | 1.000 | .077 | .110 | .583** | .057 | .276** |
| AGE | .077 | 1.000 | .451 | .097 | -.187 | -.034 |
| CLASS | .110 | .451** | 1.000 | .141 | -.180 | .234* |
| EVAL | .583** | .097 | .141 | 1.000 | -.056 | .154 |
| PRE | .057 | -.187 | -.180 | -.056 | 1.000 | -.122 |
| SEX | .276** | -.034 | .234* | .154 | -.122 | 1.000 |

** $p < .01$, two tailed. * $p < .05$, two tailed.

Supporting the finding of the T-Test, the correlation between Sex and Score was significant with a $p$ value of .008 and a strength of .276, indicating that females were more likely than males to do well in the class. The relationship between the course Evaluation and the Score was significant with a $p$ value of .0001 and a strength of .583, indicating that those who reported positive comments in the early course evaluation were much more likely to do well in the class.

## Conclusions

The course design developed for the delivery of this course over distance accomplished the primary objective of creating a location-neutral learning experience. Students performed equally well regardless of location or method. Female students were found to perform significantly better in this course, regardless of location. This result was interesting, and warrants further investigation. Students who submitted positive course evaluations during the second week of class were found to do much better in the class regardless of location or method. Strategies for the early identification of the students submitting negative evaluations are under development with the goal of offering academic advising and or remedial programming.

A surprising number of students withdrew from the distance delivery section of this course. The need for systematic and professional academic advising was identified as one reason. Withdrawing students also stated that the course contained much more scientific content, and a greater expectation of mathematical and scientific competencies than the community college classes offered at their site. Responding to these concerns, a full-time assistant program coordinator has been hired and will assist students with accessing academic advising and provide a local source of information to aid in their making more informed choices regarding the selection of courses offered by the university.

## Autobiographical Sketch

**Tim Murphy** is the Distance Education Specialist for the College of Agriculture at the University of Idaho. Tim coordinates the distance education activities of the College of Agriculture and the Cooperative Extension System, conducts research, and provides pedagogical and technological assistance to faculty teaching over distance.

# Designing for the Web: Integrated Independent and Collaborative Learning on the Internet

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## Abstract

Advances in Internet technologies promise to revolutionize the concept of distance learning. Until recently, Internet-based education and training consisted of stand alone independent and collaborative tools which allowed limited interactivity with both courseware and other students. During the past six months, the ability to create interactive multimedia courseware and database applications for real-time delivery via the World Wide Web, along with improvements in collaborative tools have sparked the evolution from individual Internet-based training courses to integrated Web-based learning *programs*. Today's vision of an on-line learning program combines these new or improved capabilities, providing modern organizations with the ability to deliver just-in-time learning customized to each student's needs based on criteria such as job title, level of experience, and prior training.

Traditional analysis and design considerations associated with Web-based courseware still apply to integrated on-line training programs, but two additional factors must be considered. First, developers must assess the suitability of and need for different delivery techniques (e.g. interactive multimedia courseware, instructor-led chat rooms, guided research and study, etc.). This process can be simplified by using a delivery strategy selection model to match training needs and delivery strategies. Once the appropriate strategies have been identified, techniques for integrating individual components of the on-line program must be determined. These components include independent and collaborative tools, as well as the database module for student records tracking and management, and overall site structure.

The Federal Acquisition Institute's OnLine University is a fully integrated and functional training program residing on the World Wide Web. This and similar programs demonstrate the evolution of Internet-based training from stand alone courseware to fully integrated education and training programs.

## Introduction

The creation and application of new tools and technologies has been an integral part of human evolution and history. From the first stone tool to the latest computer chip, the changes caused by our discoveries have revolutionized peoples' lives, as well as the structure of organizations in which they function. During the past six months, the ability to create interactive multimedia courseware and database applications for real-time delivery via the World Wide Web, along with improvements in collaborative tools have sparked the evolution from individual Internet-based learning courses to integrated Web-based learning programs. Today's vision of an on-line learning program combines these new or improved capabilities, providing modern organizations with the ability to deliver just-in-time learning customized to each student's needs based on criteria such as area of expertise, level of experience, and prior training. This paper describes the components and capabilities of an *integrated on-line learning program*, and the individual and organizational benefits associated with such a program.

## Distance Learning: A Historical Perspective

Education and training is usually pictured in a classroom-style setting. This technique is still commonly used, but with the increased demands on time and financial resources produced by today's academic and professional environments, fewer individuals and organizations can afford the luxury of this setting. Because of these demands and with the advent of new or improved technologies, many professional and academic organizations have turned to a method of education and training known as *distance learning*.

Until the early 1980s, traditional distance learning consisted primarily of printed materials delivered to students in the form of correspondence courses. Other technologies have entered the distance learning arena in recent years, but the invention of the World Wide Web (WWW) has and will continue to revolutionize the very nature of distance learning. The Web's flexibility brings together all of the capabilities of existing distance learning media (print, video, computer based training, satellite delivered training, etc.) in one centralized "location." It also allows for the use of many capabilities that were previously unavailable in the field of distance learning. The combination of these previously independent and new capabilities is what gives us the functionality of a modern on-line learning program.

## Tools for Web-Based Learning

Today's distance learning student can experience independent, self-paced as well as collaborative learning using a variety of Web-based tools. Collaborative tools allow students to communicate with each other and/or with the instructor. These tools fall into two categories: synchronous and asynchronous. Synchronous collaboration occurs when the instructor and students(s) interact simultaneously, whereas asynchronous collaboration allows students to interact according to their own schedules. (Steiner, 1996, p. 1)

The Internet provides many opportunities for synchronous learning. The evolution of virtual environments such as Multi-user Dimensions (MUDs) and MUD, Object Oriented (MOO) has provided opportunities for individuals to collaborate in real time via the Internet since the early 1980s. In recent years, these environments have been superseded by the use of chatroom software.

Chatrooms provide one of the most important capabilities of a modern on-line learning program. Chatrooms can be used as a virtual classroom in which the students and instructor meet at regularly scheduled times. The instructor can screen student responses to the entire room, much like selecting a student to speak by having them raise their hand. Documents such as homework assignments can be sent and received in the form of electronic files. Electronic whiteboards can be used to draw notes and pictures, and the class can even take a "guided tour" by using a feature that allows the instructor to force students' browsers to go to and return from other URLs.

Asynchronous tools also provide critical functionality for the on-line student. The oldest form of asynchronous communication on the Internet is electronic mail, or e-mail. Though e-mail is a more mature technology, it can play an important role in an on-line learning program. Students can use e-mail or related systems such as bulletin boards to collaborate with other students or to ask the instructor questions at any time of the day or night, and the other party can respond according to his or her own schedule.

Collaborative learning provides many opportunities for a distance learning program, but it does not provide the level of independent or interactive stimulus that is best suited to many topics. One example is the use of reference documents and information. An instructor can send required information to students using e-mail or other file transfer procedures, but this approach eliminates the opportunity for a student to learn or refine essential research skills critical to "real world" survival, and it limits the creativity and innovative thought process students might otherwise experience.

The WWW allows students to use a variety of independent tools. For example, Web links and searches can provide on-line learners with a multitude of information and opportunity to refine research skills. An organization can focus these efforts by creating a Web page with links to its own on-line library, or to relevant sites from other organizations.

The Web also provides students with the capability to use self-paced interactive multimedia courseware. Interactive courseware has been delivered via computer for several years, but until recently was difficult or impossible to access via the Internet. When possible, access consisted of files placed on the Internet which were usually too large to be easily downloaded. Within the past year, several computer based training authoring packages have made the leap to the Web by using technologies which convert existing courseware into manageable packets of data which can be "streamed" directly to a student's desktop. The student can view and interact with the courseware in real-time, all without a lengthy download process. Interactive courseware uses audio, animations and complex interactions to maximize learning. Students can actually see complex step-by-step procedures, then replicate them through interaction with the computer. Each student controls the pace at which he or she progresses through the materials, and can repeat some or all of the training without hindering other students' progress.

With recent improvements in collaborative tools along with the ability to deliver Web-based interactive courseware and other advances, the Web is emerging as a vehicle for integrated learning programs. In order to effectively utilize Web and Internet technology, key design issues must be considered by instructional designers and developers.

## Key Design Considerations for an On-line Learning Program

### Student Recordkeeping and Courseware Management on the Web

The growth of the interactive multimedia or computer-based training (CBT) market resulted in a key capability required to develop an on-line learning program. This capability, commonly known as computer managed instruction (CMI), uses a relational database to establish a record for each student. The database can record a student's progress through the courseware, allowing the student to immediately return to where he or she left off, and even structure the courseware so that advanced lessons are only available when prerequisite lessons have been completed. It can be used to dynamically create a menu of lessons and other educational resources tailored to each student's specific needs. It does this by using demographic information entered by the student, such as field of study, job title, and company or agency.

The ability to use CMI on the World Wide Web does more than simply replicating the functionality of existing CBT. CMI on the Web is the most powerful aspect of a true on-line learning program. Web based CMI integrates all the independent and collaborative tools into one cohesive program. New students are sent to a URL where they must input demographic information. This information is processed by the CMI, which then produces a menu of lessons and other instructional activities required for successful completion of the program. This could be as simple as a series of lessons related to job skills, or as complex as a university degree program. As the student completes prerequisite independent and collaborative courses or lessons, they are granted access to the next series of instructional materials. The student can access his or her record at any time to check grades, conduct research in a virtual reference center or library, communicate with an advisor, or visit the virtual student center—all tailored to his or her needs.

The Web also provides an important new courseware management capability. A major disadvantage associated with other distance learning technologies is in determining if a student has the latest version of the courseware. Print based reference materials and text may change frequently due to technical advances. CBT is often updated to reflect the latest equipment and other technical or instructional changes. Many of these version control issues are eliminated through use of the Web. The most recent versions of reference materials and courseware are used to replace existing versions on the Web. Only one copy of the courseware resides on the Web, thus students and course providers alike can be certain that the correct courseware is being used.

### Delivery Strategy

Like all distance learning programs, some sort of methodology must be applied to create an effective, efficient learning experience. Instructional Systems Design (ISD) methodology, also known as Systems Approach to Training, is a commonly applied methodology among instructional designers. Once instructional objectives are identified, the most appropriate delivery technique is selected (i.e., print, video, CBT). Instructional designers then take this assessment a step further and identify delivery techniques specific to each objective or set of objectives. Many training programs therefore utilize a combination of instructional techniques best suited to the stated learning objectives.

An on-line learning program is unique in that it acts as the main vehicle for *all* types of delivery methods—traditional and non-traditional. Instructional designers therefore can consider the full range of independent and collaborative tools, and they are not limited in selection.

In conjunction with the selection of appropriate delivery media, a detailed technology assessment must be conducted to identify existing and required infrastructure. This assessment is critical to the success of an on-line learning program. It includes examination of the existing server and client workstation capabilities. The results of this analysis are critical in determining how best to implement an Internet based solution for an organization. The technology assessment must not be performed independent of the instructional analysis—the two are required for successful accomplishment of learning via the Web.

### Site Structure and Integration

The next step in designing an on-line learning program is deciding how to integrate the different tools in a cohesive, organized, and easy to use fashion. An organized and logical site structure can result in effective training. Students need predictability and organization (Lynch, 1995). New and returning students should enter the program from the same Web page. The organization of this core page must be both familiar and logical from a student's perspective.

Using the inherent capabilities of the Web, this is best achieved by using a graphical metaphor to portray an already familiar environment. This might be an actual or modified map of an academic campus, or of an organization's training facility. The range of possibilities is limited only by the design team's imagination and the students' experiences.

However the design team implements the site structure, it is imperative that the site be mapped out in a cohesive, logical manner. With multiple learning tools and media integrated into a robust virtual "university" for learning, students must not be subjected to barriers for learning. Configuration management also plays a crucial role as version control is requisite for effective learning.

## The Federal Acquisition Institute's OnLine University: A Model for Integrated Learning

The United States General Services Administration—Federal Acquisition Institute OnLine University, (1997) is an example of a fully integrated OnLine learning program. The FAI OnLine is currently being developed by Universal Systems Inc. using multiple

Internet technologies. While the focus is on Web-based training tools, USI is also integrating database technologies tailored for managing student records, courseware modules, and associated courseware learning "paths." The FAI OnLine is based on the metaphor of a university, providing students with typical services found on most campuses. While some university home pages provide information to students at any location, very few actually implement many of the on-line features inherent in the FAI OnLine. The FAI OnLine integrates collaborative and independent tools through multiple training programs, for procurement personnel of varying levels of experience throughout the Federal Government. The integration of these various tools in an on-line program provides a capability never before recognized in traditional or distance education and training, the ability to deliver virtually any type of instruction "just-in-time," or when it is most appropriate for each individual student.

## Conclusion

In summary, an integrated on-line learning program provides the following advantages:

- Delivery of instructional information and lessons to a large, geographically diverse audience
- Standardized independent and collaborative tools combined in a flexible but cohesive program
- Access to and navigation through the program controlled by Web-based CMI
- Lessons and information tailored to each student's needs based on demographic information such as intended area of study, prior instruction received, job title/position, and department or agency

An integrated on-line learning program provides the first distance learning solution that effectively and efficiently meets all the instructional needs of an organization. By understanding and appropriately integrating the independent and collaborative capabilities and components of such a program, training designers and developers can create a solution that will dramatically change the concept of education and training within their organization and throughout the training community.

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# The Problem of Interaction at a Distance for Video Teletraining

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## Introduction

Satellite delivered interactive video telecourses are a continuously growing way to deliver training to employees by business & industry, academia, and government. Companies like General Motors and J.C. Penny, academic institutions like Oklahoma State University, University of Wisconsin and Ohio State University, and government agencies like the Veterans Administration, US Army, and the Federal Aviation Administration all use interactive video telecourses to provide training to workers across the country. Interaction is a key to successful telecourses. However, interaction is only possible to the extent provided for by the interactive capabilities of the technology.

## Background

The necessity for workplace education and training continues to grow at a shocking rate. Shortages in human resources are being created by demographic, economic, and technical forces that impact both new and experienced workers. Current employees now need a considerably broader set of skills along with a firmer foundation of basic skills in order to assist learning on the job (Carnevale, 1991; Wexley & Latham, 1991). It has been estimated that office workers will require retraining between five and seven times during their careers (Wexley, 1984). It has been predicted that the amount of information produced will increase exponentially every year (McIsaac & Gunawardena, 1996) increasing the rate of obsolescence and the need to continually train and retrain employees, particularly professionals (Wexley & Latham, 1991). Also, the availability of qualified new workers is shrinking, increasing the amount of new workers coming from parts of society historically lacking the basic entry level skills for many of today's jobs (Garvin-Kester & Chute, 1991; Wexley & Latham, 1991). One result is that increasingly more businesses and government agencies are developing their existing employees rather than trying to hire new workers who possess the newly needed skills. Between 1981 and 1991, American businesses spent in excess of $2 trillion to train their employees (Wexley & Latham, 1991). As a result, many businesses and government agencies are looking for ways of providing this necessary training at a much lower cost.

Many organizations are turning to a form of distance education called interactive video teletraining as an alternative to traditional classroom training (Garvin-Kester & Chute, 1991). To increase interactivity in this environment, a new technology, called student response systems, is being used (Portway & Lane, 1992). In addition to increasing interactivity, student response systems are also claimed to increase learning and satisfaction in interactive video teletraining courses (Portway, 1992). However, these claims are not supported nor documented by research. As a result, distance education decision makers are being forced to make decisions about this expensive training technology without the information to do so in an informed manner.

## Purpose

The purpose of the study was to examine the effect of using a student response system on learner achievement, satisfaction, and the amount of interaction. This study compared the effect of using a student response system to the effect of using an audio conferencing system on learner achievement, satisfaction, and the amount of interaction in an interactive video teletraining class. The objective of this study was to answer the following questions; (1) would the use of a student response system increase learner achievement more than the use of an audio conferencing system, (2) would learners using a student response system report higher levels of satisfaction than learners using an audio conferencing system, (3) would learners using a student response system perceive higher levels of interaction than learners using an audio conferencing system, and (4) would learners using a student response system display increased levels of interaction over learners using an audio conferencing system?

## Methodology

The module used for this study was the "Marketing Services" class within the Principles of Marketing course at Langston University. This module covers the unique elements of Marketing Services. This module was selected since the objectives are suitable for conversion to and delivery as a telecourse within the usual class period.

This study used a non-equivalent control group design. Two key elements of this design are (1) the non-random assignment of subjects to treatment groups, and (2) the pretesting and posttesting of all groups (Borg & Gall, 1989). The design was chosen because of the inability to assign subjects to treatment groups since intact classes were used for each treatment.

Group 1 used a student response system. This technology provides a keypad for each student. The keypad allows verbal interaction between the instructor and the students and between students at different sites. The keypad also allows students to answer multiple choice, yes-no, true-false, and numeric value questions asked by the instructor.

Group 2 used an audio conferencing system. This technology provides a microphone for every two students. The microphone allows verbal interaction between the instructor and the students and between students at different sites.

The subjects were undergraduate students taking the Principles of Marketing course at Langston University. A total of 67 subjects volunteered for the study with usable data being collected from 56 subjects, 30 in Group 1 and 26 in Group 2. Sixty-eight percent of the subjects were female and 32% were male. The average age was 22.4, with a range from 19 to 46 years of age. Five percent of the subjects were white, while 95% were African-American or African.

The Marketing Services unit was converted to maximize the use of the two technologies. Treatment group 1 received instruction that had the use of a student response system incorporated into its design and delivery. Treatment group 2 received instruction that had the use of an audio conferencing system incorporated into its design and delivery.

Both treatments were delivered at the Federal Aviation Administration Academy in Oklahoma City, OK. Both groups were divided into two subgroups and located in two identically equipped classrooms. Each group was split into two subgroups allow student to student interaction between the subgroups using either the student response system or the audio conferencing system. Students were not located in the studio with the instructor during the broadcasts.

## Findings

The findings for this study are reported by the outcomes for learner achievement, learner satisfaction, perceived interaction, and actual interaction. Learner achievement was defined as the difference in mean posttest scores between the two treatment groups. It was measured by a 20 item multiple choice posttest. A pretest was administered one week before each treatment. The posttest was administered the first class period following each treatment. As subjects were not randomly assigned to treatment groups, both groups were administered a pretest and a posttest. Analysis of covariance (ANCOVA) analyzed test scores so that pre-existing group differences were controlled by adjusting posttest scores. Group 1 had a mean pretest score of 8.60 while Group 2 had a mean pretest score of 8.8. Group 1 had a posttest score of 13.0 while Group 2 had a mean posttest score of 11.8. Group 1 scored significantly higher on the posttest that did Group 2. The results of the analysis of covariance also show that the posttest means, adjusted to control for pre-existing group differences as reflected in the pretest, were significantly different ($F = 6.596$, $df = 1, 53$, $p < .05$). That is, Group 1 performed significantly better on the posttest than did Group 2.

Learner satisfaction was measured by the administration of a 33 item Likert-type End-of-Class Survey. The 33 items were grouped into seven key factors for evaluating telecourse satisfaction. The survey was administered immediately after the treatment for each group. Students were asked to rate each item from 1 (Very Poor) to 5 (Very Good). The mean score for each of the seven factors, as well as for the overall survey, were compared using $t$-tests. Group 1 rated their overall satisfaction level significantly higher than did Group 2 ($t = 2.420$, $p < 0.05$). However, a review of the seven factors comprising the overall evaluation of learner satisfaction shows that this difference is attributed to the participants' attitudes towards three specific factors, At-Site Personnel, Promptness of Material Delivery, and Support Services.

It should be noted that none of the nine items comprising these three factors appear to be appropriate for this one-class study. All of these items are appropriate for evaluations involving entire courses, but not just one class within a course. If these four factors, and the items that comprise them, are deleted from the End-of-Class Survey, and the statistics are recalculated, the difference between the two groups is no longer significant. That is, there was no significant difference in learner satisfaction between the two groups.

The perceived level of interaction was measured by six interaction related items on the End-of-Class Survey. The six interaction related items were: Item 6, Instructor Made Students Feel They were Part of the Class, Item 11, Instructor Encouraged Participation, Item 14, Time Taken to Answer Site Calls During Class, Item 18, Clarity of Tele-Response System Audio, Item 19, Talkback Delays of Tele-Response System, and Item 21, Ease of Operating Equipment at Site.

The mean rating for Group 1 on the six interaction items was 4.522 and the mean rating for Group 2 was 4.478. The computed $t$-Value was 0.357, which is not significant at the $p < .05$ level. There were no significant differences in the amount of perceived interaction between the two groups.

The actual level of interaction was measured analyzing video taped recordings of each treatment session using Flanders Categories for Interaction Analysis. Two trained evaluators watched each video taped treatment separately, classifying each interaction event into one of the ten Flanders Categories for Interaction Analysis. They then watched each treatment video tape together to resolve differences and come up with a final set of classifications for each treatment.

Group 2 displayed significantly more verbal interaction events than did Group 1 ($\chi^2 = 54.827$, $df = 1$, $p < .05$). A further analysis of the data shows that this effect is attributable to the number of interactions in Category 3—Accepts or Uses Ideas of Students, Category 4—Asks Questions, and Category 8—Student Talk—Response. The results indicate that Group 2 had a significantly higher level of verbal interaction than did Group 1.

Flanders Categories of Interaction Analysis does not directly provide for the classification of student data responses available through the student response system. Group 1 had six questions asked for which students were able to respond using the data response capability of the keypad. Each student present responded to each question, providing 177 total data responses to the six questions. If these 177 data responses are added to Group 1's number of interaction events, Group 1 would then have a significantly larger overall number of interaction events than Group 2 ($\chi^2 = 4.318$, $df = 1$, $p < .05$).

## Conclusions and Discussion

The findings from this study need to be considered carefully. First, the subjects of this study were undergraduate students at an Historically Black University in Oklahoma. Ninety-five percent were either African-American or African, not typical of the US student population as a whole. Additionally, for over two-thirds of the participants this was their first exposure with the technology, bringing into question whether these results are representative of results over a long term exposure to the technologies.

The most surprising result from this study is the significant difference in learner achievement. This finding is contrary to media comparison studies in general (e.g., Salomon & Clark, 1977; Mielke, 1968). One external factor may have contributed to this difference in learner achievement. It was the time in the semester the instruction was conducted. Due to the availability of the FAA facility, Group 1 received the treatment late in the semester, while Group 2 received the instruction early in the semester. It is possible that this difference contributed to the difference in scores. However, it is also possible that since all students in Group 1 took the opportunity to answer all of the data format questions, that maybe they paid more attention to the instruction. Kwiatek (1982) contends, the more learners think and talk about a subject, the more that subject becomes integrated into their memories and experiences, and the more the learners come to know the subject and act upon it.

The results for learner satisfaction and perceived level of interaction were as expected. Since virtually none of the learners had experience with both technologies, their satisfaction was grounded upon their use of their particular technology, and not upon their preference for one or the other of the technologies. Perhaps if learners had been exposed to both technologies, they may have expressed a preference for one technology over the other. Also, since both treatments had strategies designed into the instruction that maximized the use of each technology, it is not surprising that learners in both groups perceived relatively high levels of interaction.

Results for the actual level of interaction also had unexpected results. The amount of verbal interaction was significantly higher for the treatment group using the audio conferencing system. However, this difference may be attributable to the experience of the instructor. This was the first experience with this technology for the instructor. The student response system treatment group was first, followed by the audio response system treatment group. The instructor may have been more comfortable overall and therefore more willing to use the technology during the second treatment. Also, the student response system requires more experience and practice to use effectively. More instructor experience with the technology may eliminate these differences.

In summary, telecourses that use student response technology can have more interaction than is experienced in traditional classrooms, if such interaction is designed into the instruction. Students learn receiving instruction delivered as telecourses.

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# Preparing Information Systems Professionals for Managerial Roles: A Computer-Conferenced Masters Degree Program

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In 1995, the Computer Information Systems (CIS) Department at Southwest Missouri State University (SMSU) found itself in an opportune position to provide the cutting-edge education demanded by information systems professionals with in-field employment experience and an undergraduate degree. This education is provided by means of a master degree curriculum designed to update the training and technical experience of degree candidates by exposing them to state-of-the-art technologies and managerial techniques. The program makes use of the expertise of the nineteen Ph.D. faculty members in the university's CIS Department, faculty members from other universities around the nation, and information systems specialists within the region. Using a blend of residential classroom teaching and computer conferencing, students in the program complete the degree with a combination of traditional classroom teaching and distance learning experiences. This approach enables information systems professionals to enhance their knowledge and complete an advanced degree without needing to interrupt their careers and jobs.

## Background Information

Although the Master of Science in Computer Information Systems degree program is new to SMSU, it extends an existing area of graduate study, the Masters of Business Administration (MBA) degree program with a concentration in Computer Information Systems. The MBA offerings in Computer Information Systems are aimed at non-information systems professionals; whereas, the MS in Computer Information Systems is designed for individuals with specific academic and employment experience in the information systems profession.

The information systems field is a dynamic one in which continued professional education is essential for those who wish to advance their organizations and their careers. Nationally, manpower needs and career opportunities in information systems are expected to grow faster than average. In addition to the projections for current career opportunities, the proliferation of personal computers in organizations continues to alter the centralized computing structures and to influence computer related jobs. Position responsibilities are changing rapidly in this swiftly evolving field. Titles and skills change with the development and dissemination of new technologies. A college education is the minimum requirement for entry-level computer information systems related career opportunities. With the professional "half-life" of a computer professional's knowledge estimated to be as short as twenty-four months, there is extreme pressure on employees to keep current in their field. Thus, for advancement as well as current career requirements, computer professionals need exposure to contemporary management education, practice and technology. The MS in Computer Information Systems program addresses this need.

## Unique Features of the Program

The masters degree discussed herein has two unique aspects. First, it is designed for *experienced* professionals in the information systems field. It serves persons with three years minimum work experience in information systems. Second, the program increases access to geographically dispersed persons by using internet-based computer conferencing to augment concentrated on-campus instruction. University classrooms and computer facilities are used between semesters and during the summer for intensive teaching sessions. Subsequently, students complete the course using daily contact via computer conferencing with their professors. Each semester consists of both on-campus instruction (equivalent to 50% of a normal semester's contact hours) and off-campus computer conferencing periods (constituting the remaining contact hour equivalency).

A typical on-campus experience involves seven and one-half, eight-hour days of instruction covering three courses. A specific course will include twenty contact hours with the class. Computer conferencing via the internet occurs during an additional eight weeks per course (to provide the class equivalency of the remaining contact hours). To calculate contact hour equivalency for computer conferencing,, three conferencing hours are considered equivalent to one classroom contact hour.

## Pedagogical Aspects of the Program

The program's delivery system has two primary components: the on-campus segment and the computer conferencing segment. During the seven and one-half day on-campus segment students attend class in an intensive format of eight hours per day. Traditional instruction builds personal knowledge of course content, class expectations, and interpersonal characteristics of both students and professor. By repeating this process for each of the four terms, the on-campus experience helps the class cohort develop strong loyalty and identity as well as providing the opportunity to present material that needs face-to-face exposure (e.g., formal presentations, hands-on demonstrations, etc.). To increase the efficient use of time together, faculty provide students with prepared handouts, notes, and assignments. Further, to reduce time away from class during these sessions, breakfast and lunches are catered to the site for student convenience.

The computer conferencing segment of course delivery occurs asynchronously whereby students retrieve the comments from their professor and classmates daily. This allows each member of the class to access the discussion during the times that are most personally convenient. Class discussion takes on the characteristics of an extended electronic mail exchange in which any person can make comments for the entire class to view or privately where only specified person(s) may view it. The strength of such a system is that each class member receives a personal response from the instructor. The approach is much more of an individualized tutorial for that student, with the added advantage of benefitting from the collective wisdom gained from class discussions. While sessions extend for five calendar months, students interact via computer conferencing for no more than two courses at a time as each course's computer conferencing extends for eight weeks. During the on campus phase of the course, professors hand out materials that would be handed out throughout the semester in a traditional university course. Later, during the conferencing portion of the class, these materials are assigned to and studied by the whole group. To develop interpersonal computer conferencing skills, students are assigned to a study team to work through collaborative assignments together. They complete these assignments by pooling their intellectual resources across the internet. Examples of such assignments include case analysis, articles to read and discuss, homework problems to complete and submit, etc. Students can submit any written assignments by fax, by surface mail, or by the internet. Faculty can return these graded assignments using similar means.

This two-phase approach to course deliver results in the provision of a high quality program to individuals who otherwise would not have access to such education because of the constraints of career demands, absence from family, proximity to the granting institution, and the like.

## Program Requirements

Several elements of MS in CIS program structure, including admission standards and research requirements are modeled after the standards used for the university's MBA program. The MBA admission standards for GPA and GMAT have proven effective in gaining a high quality student population and they have had extensive testing in the accreditation process of the American Assembly of Collegiate Schools of Business (AACSB). Hence, these standards provide a good basis for application in the MS in Computer Information Systems Degree.

### Admission Requirements

The Master of Science in Computer Information Systems is open to persons who meet the following qualifications:

- Three years of professional information systems work experience.
- A bachelors degree with a grade point average (GPA) of at least 2.75 for the last 60 hours of academic work.
- An acceptable score on the Graduate Management Admissions Test (GMAT).

Students who do not meet the normal admission requirements, but would otherwise be excellent candidates for the program, are considered for admission on a case-by-case basis.

### Prerequisite Course Requirements

The program's curriculum requires that participants have the following level of academic preparation prior to enrolling in graduate-level courses:

- One course from an institution of higher learning in each of the areas of database, systems analysis and design, and programming.
- A background in business administration including exposure to accounting, finance, marketing, management and economics. These business requirements may be satisfied by:
  - an undergraduate or graduate degree in business administration or
  - courses equivalent to at least a total of nine hours from any of three different areas of business listed above.

The MS in CIS Program Director will determine if the student has the necessary background.

### Curriculum Requirements

The MS in CIS is a 36-hour program that includes 30 hours required courses plus six hours of electives. Students take nine hours each semester for four semesters. This curriculum, along with a typical schedule of classes, is shown below:

| | |
|---|---|
| *Session 1 (January–May)* | |
| CIS 632 Information Systems Planning | 3 hours |
| CIS 634 Staffing the Information Systems Function | 3 hours |
| CIS 636 Network Planning and Administration | 3 hours |
| *Session 2 (July–November)* | |
| *CIS 638 Information System Project Management | 3 hours |
| *CIS 640 Comparative System Development Methodologies | 3 hours |
| *CIS 642 Management of End-User Computing | 3 hours |
| *Session 3 (January–May)* | |
| CIS 644 Information System Management | 3 hours |
| CIS 646 Data Modeling and Database Administration | 3 hours |
| Elective: Select from CIS 648, CIS 652, or CIS 656 | 3 hours |
| *Session 4 (July–November)* | |
| CIS 650 Information System Resource Acquisition | 3 hours |
| CIS 654 Organizational Transformation | 3 hours |
| Elective: Select from CIS 648, CIS 652, or CIS 656 | 3 hours |

Electives are chosen from among the following classes:

| | |
|---|---|
| CIS 648 Management of Application Programming | 3 hours |
| CIS 652 Operating Systems | 3 hours |
| CIS 656 Special Topics in Information Systems | 3 hours |

### Satisfactory Completion Requirement

A cumulative grade point average of 3.0 (on a 4.0 scale) must be achieved and maintained in courses taken in this program at SMSU.

## Facilities and Technology

During their twice-a-year visits to the Southwest Missouri State University campus, program participants are instructed in facilities housed in David D. Glass Hall, the home of the SMSU College of Business Administration. From its four computer laboratories and four computer classrooms to its satellite communications capabilities, Glass Hall is state-of-the-art. The building symbolizes Missouri's commitment to higher education, as well as the importance of private giving to SMSU. Without the success of the University's capital campaign, this facility could not have been built. Many successful SMSU business graduates are among those who made the campaign a success. One of these graduates is David D. Glass, President and Chief Executive Officer of Wal-Mart Stores, Inc., after whom the building is named.

Because the variety of majors offered by the College demanded specialized classrooms, COBA faculty and students designed a number of classrooms to better serve specific educational needs. These include the computer classrooms mentioned above, small seminar rooms, business strategy/policy rooms, rooms that can be equipped as distance learning facilities, a number of rooms with rear-screen projection capabilities, as well as traditional tiered and flat lecture rooms in a variety of seating capacities. Students need a quiet place to prepare for exams, review notes with a classmate, research a term project, or simply relax. With this in mind, Glass Hall provides students with areas for organizing, reading, and relaxing. And since relaxing often includes a craving for food, a snack bar is also available. Housed on the building's first floor, with its own entry, offices, conference rooms, classrooms, and parking lot is the spacious Center for Business and Economic Development, the outreach arm of the College. The Center's corporate-quality "Decision Room," equipped with 24 Pentium workstations and a NEC data projection system, is used as the computer classroom for the MS in CIS program.

Computer conferencing when students are away from campus takes place on an internet-based bulletin board system housed on its own Pentium-Pro web server. Both public (open to all students in a course) and private (student-to-professor and student-to-student) conferencing areas are available. Sample sessions from this system will be provided during the presentation in Madison.

## Summary

The pace of the information systems field requires its members to engage in continued professional education to remain competitive. The Computer Information Systems Department at Southwest Missouri State University has the capacity and ability to provide such education using distance learning techniques. Overall, the masters degree in Computer Information Systems meets an ongoing need for professional education in the information systems field. The program brings quality education in a convenient format to a widely dispersed student population. The program was implemented in January of 1997, and the authors plan to conduct a follow-up study after the program has been in operation for two years.

### Autobiographical Sketches

**James B. Pettijohn** is a professor of finance and the Associate Dean of the College of Business Administration at Southwest Missouri State University. He earned his Ph.D. degree in business administration from the University of Nebraska-Lincoln. Dr. Pettijohn's research interests included computer-based financial education, applications of the internet to higher education, and computer-mediated distance education. In addition, he is the coauthor of a number of computer software ancillaries for use with a variety of financial management, investments and personal financial planning textbooks.

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# User Friendly Teleconferencing at the Community College

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## Background

Today, new information is being created and transmitted at an incredible pace. Associations, businesses, educational institutions, as well as individuals, are struggling to keep up in the information age. Keeping current and communicating efficiently is a common preoccupation for all organizations and is vital to their continued success. Effective communication is essential to keeping association members involved, workers trained, skills updated, and organizations current.

Organizations, including education institutions, must constantly seek to find cost-effective means to communicate and deliver:

- The benefits of the organization to its employees, members and constituencies
- The mission, goals and direction of the organization on issues of importance to its growth and success
- Professional development and networking opportunities
- Timely information on initiatives, activities, new products and events
- Quality products and services

Communication must be efficient and timely. In addition, organizations must continually find means to receive timely and accurate feedback from their employees and constituencies. In the modern organization, communication is flowing in two directions; from the organization to its employees and from employees to the organization.

Organizations use a variety of tools including newsletters, publications, meetings, workshops and conventions to achieve their communications objectives. In the information age, organizations use more sophisticated electronic communications tools such as video tape, Internet and telecommunications technologies including teleconferencing.

The ability to effectively use today's new electronic communications tools are typically hampered by a lack of financial resources and lack of technical knowledge; this is particularly true when teleconferencing is applied to a national audience. While many organizations are eager to use teleconferencing (video and audio), a systematic, coordinated and affordable infrastructure is not currently available for use on an occasional basis.

## Illustration

In the recent past, many organizations have tried to address this problem. In 1986, the state of Florida created a satellite network, SUNSTAR, for training and information delivery available to all citizens of the state. Community colleges were provided with satellite dishes in exchange for agreeing to participate in a coordinated network. Groups such as the Florida Association of Insurance Agents (FAIA); state departments of Labor, Health, and Education; and the Florida Academy of Trail Lawyers used the network to provided training and up-to-date information to their constituencies.

A particularly good example of using teleconferencing and community colleges as a successful communications tool occurred with the FAIA in the aftermath of hurricane Andrew. After hurricane Andrew, the Florida legislature passed sweeping changes in insurance laws for the state. FAIA had the responsibility of informing its members from Pensacola to Miami of these changes immediately or their members would suffer potential financial consequences for not following the new regulation. Using SUNSTAR, FAIA trained and informed nearly 7000 insurance agents of the new regulation. The agents received the information at the same time and in the same manner, thereby maintaining their competitive edge.

SUNSTAR, the community colleges and the FAIA experience is very positive. However, as FAIA and others looked to provide training beyond the state of Florida, they found few other states with coordinated systems.

## Need and Rationale

The American Association of Community Colleges, Community College Satellite Network has been approached by many organizations and groups requesting the services of community colleges for the delivery of training via satellite and land based videoconferencing. These request come from a variety of public and private groups including: California Wellness Foundation; American Water Works Association; American Vocational Association; American Counseling Association; and the National Alliance of Business.

In 1993, AACC surveyed community colleges to see if they would be interested in providing such an infrastructure. At that time over 300 colleges indicated that they would participate in a public infrastructure that served the needs of the occasional user of telecommunications services. However, a lack of consistency and defined criteria for services, varying rate structures, efficient means of scheduling and a systematic means of coordinating the colleges hampered the further development of a nationally coordinated network.

Several private industry organizations are also sensing a need for a publicly accessible satellite network. United Artist, Marriot Resorts and Wescott Communications are all developing various networks the may be used for public events and training. The cost to access these networks are high and they do not have the same potential geographic reach as community colleges.

With a facility located within approximately 90 miles of every U.S. citizen, community colleges provide a convenient and logical location for nationally distributed telecommunications training and meetings. The majority of community colleges already provide workforce training and retraining for their communities. Most community colleges are experienced in using telecommunications technology for providing information and education.

Through research conducted in 1995-1996, AACC is aware that approximately 85 percent of the nation's 1,100 community colleges have the ability to receive satellite delivered teleconferences. In addition, more than 300 colleges have acquired the ability to transmit and receive two-way videoconferences over existing phone lines. Over 90 percent of these sites offer their facilities for use to external groups. AACC has developed an electronic directory titled *Teleconferencing Resources at US Community Colleges* to document telecommunications capabilities and services available at these colleges for external user groups.

## Action

There is a tremendous need for a coordinated teleconference service at the nation's community colleges. Based on AACC's research, community colleges have the technical hardware to provide a national training network.

A community college teleconference network as described would assure community colleges a place in the increasingly competitive continuing education and training market. New and potential students would be brought to the community college. The community college would be identified by the community as a high tech facility for a variety of training and information services.

Community colleges could use the network to identify and develop partnerships with other community colleges in the development of distance education curricula. Community colleges would have the ability to maximize the development of customized training with access to a network providing statewide, regional and national distribution.

The key to building such a network is commitment and organization at the local community college level. Many colleges lack a coordinated policy to deal with request for teleconferencing services. Local constituents are often left with an impression that community colleges don't understand or welcome their request for teleconference services.

Strong and coordinated administrative policies can improve and increase the use teleconference services by community members. Issues which need addressing include:

- ❖ What is the level and nature of demand for telecommunications services in your community
- ❖ How to efficiently and effectively coordinate facilities usage for internal and external audiences

- How to ensure ready and equitable access to a variety of community members technological needs
- How to standardize services and pricing among local campuses as well as nationally with other community college institutions
- How to effectively facilitate activities between your local audience and the remote sponsor of the events
- How to assure the appropriate use of these media as communications tools
- How to establish a reputation for the technical reliability of your services
- How to develop and implement joint marketing activities on teleconference projects between organizations and community colleges

## Conclusion

The benefits of providing user friendly teleconferencing are enormous for community colleges and the communities they serve. As we continue to look at the educational opportunities that new digital technologies provide, let us not overlook the policy changes necessary to implement them successfully. Telecommunications technologies are making the delivery of education a highly competitive business. Making access to teleconference technologies at community colleges a "user friendly" process is a first step into increasing educations competitiveness in this newly developing education marketplace.

## Autobiographical Sketch

**Monica W. Pilkey** accepted the challenge of revamping the American Association of Community College's, Community College Satellite Network in 1993. As the network's Director, Ms. Pilkey is currently engaged in building and improving network services to member institutions as one way to strengthen and expand the Community College Satellite Network. She serves at the American Association of Community Colleges (AACC) staff liaison for its Commission on Learning and Communications Technologies; a group of presidents and academic deans who advise the AACC Board on technology policy affecting community colleges. She has been involved with teleconferencing and videoconferencing since 1988 when she assisted in coordinating Florida's first satellite teleconference "An Experiment in High Tech Democracy" with Commissioner of Education, Betty Castor. Ms. Pilkey has produced and coordinated over 150 live interactive teleconferences. Previously, Ms. Pilkey was the Director of Florida's SUNSTAR Network, a public/private satellite network of community colleges, universities and k–12 schools in Florida.

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# Use of Distance Learning Technology in Linking Academic and Community-Based Learning Environments

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The concept of the Area Health Education Center (AHEC) program was developed at a national level over twenty five years ago to address a need to improve access to health care in underserved areas by promoting a model of educating health professions students in these sites. Currently, more than thirty states have programs that develop partnerships between academic campuses and underserved communities. A key feature of AHEC programs is recognition of the need for a multidisciplinary approach to health care in underserved areas and modeling education of health professions students to reflect these needs. (1)

The Wisconsin AHEC began in 1991 and built into its mission statement the concept of improving access to care by developing community-based, client-oriented, culturally relevant, collaborative health education programs. One of the important goals of the Wisconsin AHEC is to support the development of partnerships between academic institutions and communities. At the same time, the Wisconsin AHEC offered a forum for the development of partnerships between different academic campuses and disciplines. (1)

Typically, experiential training of health professions students is with a preceptor of that same discipline. Wisconsin AHEC developed a unique concept of a community education center (CEC) to expand the training of health professions students to include an understanding of their own professions value and focus in relationship to other health professionals, a clearer concept of the contribution of other providers, an appreciation of the need to work with other providers and the client/patient to develop planning, an opportunity to develop programs responsive to the needs of an underserved community, and a forum to practice working professionally in a collaborative fashion. (2)

Different CECs may provide students with a variety of activities to facilitate achieving these educational objectives. For example, students may be given an opportunity to work with a provider of a different discipline on a regular basis to gain an understanding of the unique contributions of that discipline. Several students, representing different disciplines, may be given an opportunity to do a community needs assessment or develop a community-based educational program.

Each CEC has an educational coordinator who works with the students at the site to develop experiences to achieve their educational objectives. Since students may not be exposed to ideas of interdisciplinary practice or community-based care in their academic programs, one of the needs for students at a CEC site are opportunities to discuss concepts related to the AHEC mission. Discussion groups may be helpful as the learner begins the process of translating theory into practice.

Barriers may exist in organizing discussion groups for students. The various academic programs use different lengths and times for rotations, so in some sites a student may be alone. Even if several students are at a CEC simultaneously, they may be, especially in rural sites, involved in activities in different communities separated by many miles, making it difficult to come together.

Over the past two years, faculty from the School of Pharmacy have gained experience in using computer conferencing for students participating in traditional clerkships. Since students may not routinely have access to a computer terminal at the same times, we sought strategies to create a discussion group that students could "drop into" in an asynchronous fashion. The discussion leader for these traditional clerkships is a faculty member. He or she will provide background information to the clerkship student on a topic and then encourage student input into the discussion. For example, the topic of the importance of "two-way" conversation in patient communication is discussed briefly. Students are reminded of information they received in earlier didactic coursework in a communications class. Students are encouraged to offer examples they have seen in their practice sites and to provide comments about what they read from their peers. A typical discussion session may last a week, giving students at different sites an opportunity to access the computer several times. Development of computer conferencing has enabled us to place students at very distant sites and still maintain a connection with them.

One of the faculty involved with coordinating a clerkship course also serves a member of the AHEC faculty workgroup, a group of faculty from a variety of schools and campuses across the state working with AHEC programs. It seemed that some of the barriers to bringing students together at CEC sites were similar to the barriers in facilitating discussion sessions with clerkships students placed at various sites throughout the state.

One of the rural CEC sites was selected for a pilot of use of FirstClass® software to facilitate the connections between the CEC educational coordinator and students rotating at the site. In addition, faculty from the School of Pharmacy and the School of Nursing at the University of Wisconsin were able to participate in the discussion sessions.

The University of Wisconsin Division of Information Technology supports the FirstClass® server. This support has allowed the School of Pharmacy to easily add discussion groups as needed for various courses that require this type of technology. A new FirstClass® discussion section was developed for the rural CEC. The students required minimal training to use the technology. The faculty did spend a half day at the rural CEC site installing the software and training on how to use the software. The faculty also did planning with the rural CEC faculty relating to changes in the course on how to effectively use FirstClass®. The changes also reflected the decreased use of live discussions.

Faculty from the two health professions schools and the community educational coordinator each developed a discussion topic. For example, a background paper was written describing elements of interdisciplinary practice. A series of questions were developed to encourage the pharmacy and nursing student to report their observations of practice reflective of this style of practice. Both faculty from the Madison campus and the local educational coordinator provided feedback to the students on their observations.

In using computer conferencing, the comments from these first two students may be saved and viewed by subsequent learners at the site. In this way, students may have an opportunity to learn from other students that preceded them. The computer record of student learning activities is also helpful to the educational coordinator in documentation of learning activities.

One of the potential long range uses of this technology would be to link CEC sites electronically. This would increase the likelihood of students from a variety of disciplines to be able to share experiences and learn from each other during their rotations at CECs. It would potentially permit a student experiencing practice at a rural CEC to connect with students rotating in an urban CEC. Educational coordinators from several sites may be able to more easily communicate with each other in developing educational programming. The electronic conference also offers an opportunity for faculty from different schools and disciplines an opportunity to work with community education coordinators, with students, and very importantly, with each other.

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### Autobiographical Sketches

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**Dr. Connie Kraus** is a clinical assistant professor. She joined the faculty at the School of Pharmacy in 1993 and has her clinical practice at Wingra Family Medicine Clinic in Madison. Dr. Kraus has an interest in public health and in women's and children's health issues. Her research interest includes evaluation of interdisciplinary teaching as an education medium for health profession students. To foster these interests, she has become actively involved with the Wisconsin Area Health Education Center (AHEC), which uses an interdisciplinary teaching model to provide educational experiences for health care students in rural and urban underserved areas.

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# Partnering Universities and Public Television to Deliver K–12 Programming

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## "We Have This Idea for You . . ."

Kentucky Educational Television, the state's public television network, knows what public school teachers in the state want on classroom televisions. KET maintains a phone line for viewer comments and requests, sends out questionnaires and surveys, and visits schools; all to determine how public television can better meet the needs of Kentucky's students. One message KET received very clearly was the need for electronic field trips. Teachers wanted the opportunity to show their students the sights of Kentucky without having to schedule busses to do it. Considering the 400-mile trip from the Mississippi floodplains in the West to the Appalachian Mountains in the East, seeing many of Kentucky's sights in person is an impossibility for most Kentucky classes.

So, in 1995, KET aired *An Electronic Field Trip to a Coal Mine*. The state's coal industry cooperated with KET to take a look at surface and subsurface mines in both the eastern and western parts of the state. The trip was broadcast directly to all public schools through KET's StarChannel Network, a closed, three-channel satellite system reaching every school in the state, along with many public buildings, parks, etc. The program also aired at a later date on open broadcast, so any household receiving KET could watch. The trip was a tremendous success and it inspired KET to embark on a series of field trips broadcast via satellite.

In their constant review of teacher requests for information, KET had long been aware of a need for agricultural programming. As they planned field trips to a large newspaper and to the KET studios in the 1995–96 school year, KET approached the University of Kentucky College of Agriculture about the possibility of taking an electronic field trip to one of the most frequently requested sites, a farm.

## "Count Us In!"

The University of Kentucky College of Agriculture and the Kentucky Cooperative Extension Service have worked closely with KET since 1992 in the distribution of college courses for high school students to earn college credit by watching the StarChannels and the production of a series of 30-minute programs on agricultural topics called "Gee Whiz in Agriculture" airing live on KET each spring. This history of successful cooperation led to KET's invitation to UK to participate in the field trip series.

As the land-grant institution of Kentucky, UK and its Cooperative Extension Service are committed to the education of Kentucky's young people through 4-H, other outreach programs, and educational materials designed for use in the public schools. Obviously, a field trip to a farm was an ideal opportunity to advance the College's mission and reach a very large and well-targeted audience. So, faculty in the College's Distance Learning group met with the Director of Educational Programs from KET, along with the field trip's director to plan this newest partnership venture.

KET already had an established format to follow and planned to use their personnel and equipment to generate the live broadcast. What they needed help with was the content. They needed assistance in finding a suitable farm, deciding what topics to cover, and putting together a technically accurate program. Of course, UK could provide accurate content for any farming situation and could use the state's extension system to find a suitable site. In this first meeting, the partners agreed to choose a diversified farm that had a variety of animal and crop enterprises.

The faculty in Distance Learning contacted a nearby horse farm that also raised beef cattle, tobacco, and hay. Not only did this particular farm meet the diversification requirement, but the farm's owner was an eloquent speaker and strong supporter of educational programs. Margaux Farms had often hosted local classes on their field trips by bus. After a scouting visit by the KET and UK personnel involved, the group sat down again and created a rough outline of the topics to be covered in the program, such as an average day on the farm, why horses are so popular in Central Kentucky, a visit with the veterinarian and the farrier, an overview of the entire farming operation, and a discussion of horse training. At this point, the decision was made to focus on the horses. The trip was entitled *An Electronic Field Trip to a Horse Farm* and the air date was set for the Tuesday after the Kentucky Derby.

### "Now, What Do We Have to Do?"

A script for the program was written by the UK faculty and a list of participants in the program was finalized. The farm's owner, veterinarian, and farrier would be interviewed live on the program. One faculty member of Distance Learning, a former extension horse specialist, would also be featured, while the other Distance Learning faculty member would serve as host. The interviews were to focus on the jobs and careers available in this field and the training and education needed for each.

The script called for four pre-produced packages to roll into the live broadcast. UK faculty wrote scripts for three of these packages and their videographer/producer shot and edited the video for two of those scripts. KET produced the fourth package and created the animation for the other script written by UK. The roll-ins introduced students to more potential careers, but primarily showed students the many basic sciences involved in the agricultural industry.

A package of written materials accompanied the program. The materials needed to assist educators in building wrap-around classroom instruction. KET collected fact sheets, handouts, puzzles, games, bookmarks, etc., from Kentucky's horse industry, the Kentucky Department of Agriculture, and the University of Kentucky. Distance Learning faculty assisted KET in this effort. These materials repeated the program's focus on potential jobs and careers and application of basic science skills. They also allowed expansion on concepts and principles that were touched on in the program, but couldn't be fully addressed.

In order to receive the written materials, all schools had to preregister. KET handled preregistration through a World-Wide Web homepage for the field trip which they created and maintained. Schools also registered via mail, phone, and fax. KET handled all registrations and mailed out the materials to participating schools. As part of the preregistration process, schools were asked to submit questions to be asked during the field trip. KET provided the host with these questions so they could be worked into the program script. The World-Wide Web homepage (URL: www.ket.org/Trips/Farm/Index.html), in addition to the preregistration forms, included links to other resources on the Web for teachers. These links took students to many equine and agricultural sites where they could obtain more information.

One day prior to the air date, all the participants gathered at Margaux Farm for a rehearsal of the field trip. KET took this opportunity to set up and check all their production equipment. The host, farm owner, farrier, veterinarian, and horse specialist blocked out their interviews and demonstrations. Some even ran through their question-and-answer sessions, just to have a little practice. After five months of preparation, the only thing left to do was hope for good weather.

### "If It Starts Raining, Just Head for the Barn"

*An Electronic Field Trip to a Horse Farm* aired on May 7, 1996, with 550 registered classrooms and approximately 16,500 students watching. The one-hour broadcast aired live and simultaneously on the StarChannel system and on open broadcast, which reaches an estimated 10,000 households. The huge number of questions submitted by students prior to the air date could only be touched on during the field trip itself, so a one-hour, live, follow-up call-in show aired on May 14. Students called in their questions on the air and had them answered by the farm owner, farrier, and horse specialist who had participated the week before, plus a jockey. The call-in show, produced from KET's Distance Learning Studios, aired on the StarChannels only.

Despite bad weather, the field trip was an unqualified success. Except for KET's 1997 visit to Mammoth Cave, the horse farm is the most-watched field trip in the series. On May 7, KET sent monitors to several participating classrooms across the state to collect audience feedback to the program. They brought back extremely positive results, very similar to the feedback received on KET's viewer response line. By popular demand, KET continues to air the program occasionally on both the StarChannels and open broadcast.

### "That Was Great . . . Let's Do It Again!"

The terrific response to *An Electronic Field Trip to a Horse Farm* led KET to ask the UK College of Agriculture to join with them in the production of an annual farm field trip. In 1997, *An Electronic Field Trip to a Beef Cattle Farm* aired on May 6 and the follow-up call-in on May 9, with 330 classrooms registered and approximately 10,000 students watching. The program aired on KET open broadcast on June 2. This program was partially funded and supported by the Kentucky Cattlemen's Association, an industry organization composed of cattle producers, packers, educators, etc.

An expanded set of written materials was provided for the beef field trip, with materials being provided by KCA, the Kentucky Department of Agriculture, and program-specific materials created by UKCA Distance Learning. An expanded Webpage was created by UKCA Distance Learning (URL: www.ca.uky.edu/agcollege/agcom/beef/beeffld.htm), featuring information, games, activities, quizzes, links to other interesting sites, and a means of asking questions of participating experts.

KET and the College of Agriculture currently have two more field trips in the planning stages, one to an orchard and another to a hog farm. The possibilities for future trips are seemingly endless and the participating partners are enthusiastic about continuing this effort indefinitely.

## "If We Had It to Do Over Again . . ."

Because the series is an on-going project, a number of lessons learned in our first field trip have been planned and applied in the creation of our second and future trips. First, creating a live, satellite broadcast is an expensive venture, when the costs of the production truck, satellite truck, remote uplink, power drop, extensive remote personnel presence, and mailing are considered. KET attempted a "live-on-tape" approach with their field trip to Mammoth Cave, since variable spring weather could easily have kept the crew out of the cave itself for a live program. Of course, live-on-tape is better than no trip at all, but KET and UK personnel agreed the live programs were more exciting and enjoyable to watch. Therefore, it was agreed that the farm field trips should be broadcast live whenever possible. To alleviate the costs of live production, the partners have tried to tap associated industries for additional funding. Contributions from farm organizations are applied primarily to the out-of-pocket costs incurred by KET, including postage and rental of the satellite truck.

The live call-in shows following each field trip have been very positive experiences for the participants, as well as the viewers. The addition of an "ask the expert" section on the Webpage was a direct result of the large number of calls and tremendous participation by students. Unfortunately, only about two-thirds of Kentucky's schools currently have Internet access and many of those connections are not easily accessible to the students. However, as connectivity increases, this source of interaction will become an important avenue for addressing all the questions students ask when a school registers for a field trip.

The printed wrap-around materials have been praised by the teachers who want to do more than just watch the program in their classrooms. The addition of program-specific activities to our second field trip allowed students to apply knowledge they had gained during the program in their post-program instruction. Some schools, on the other hand, had students looking up information prior to the broadcast to complete their activity sheets.

The model described has worked extremely well for agricultural topics, but it would seem appropriate for addressing topics from any discipline or industry. The essential components of a successful partnership between a public television entity and a university, based on this experience, are: a source of funding, both content and technology expertise, a willingness for content experts to write and participate on camera in the creation of the programs, and a distribution system that can reach a large audience and provide interaction, either via satellite or electronically. Such a mutually beneficial partnership can provide public television stations with quality programming and give universities a unique opportunity to reach a large, hard-to-reach audience.

## Autobiographical Sketch

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# Preparing Print-Based Distance Learning Materials in the Age of the Web: 34 Tips for Effective Typography, Page Design, and Structured Content

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## Introduction

In the premiere issue of *The American Journal of Distance Education,* Pittman (1987) wrote in "The Persistence of Print" that correspondence courses had changed little in the 100 years since the University of Chicago introduced collegiate course work at a distance in 1892 (p. 31). Audio and video tapes had become available, in addition to information delivered by television and radio broadcasts. By 1981, computers had reached educational and consumer markets, but had shown little indication of becoming the ubiquitous online information nodes they are today with the World Wide Web. Not in 1987, according to Pittman, who wrote then that correspondence courses were still largely dependent on "an old delivery system—the postal service—and an even older technology—printing."

## Another Century of Print?

Today in the age of the Web, it's worth considering to what extent Pittman's observations still ring true. In the decade past, print-based correspondence seems to have maintained its appeal in the face of challenges from video conferencing and computer-based instruction. What accounts for that appeal is, in Pittman's words, "convenience and economy" (p. 34). Print is convenient, because students can work with it anywhere and at their own pace. It's economical, because there is no need for "periodic access to specialized equipment or learning sites." As evidence of print's staying power, last year at the UK's Open University, which served more than 160,000 students, as much as 90% of the learning on most courses was driven by "specially developed workbooks and published texts" (White, 1996, p. 8). The importance of print-based learning materials, even in the age of the Web, warrants continued attention.

## Democracy in Instructional Design and Development

The highpoint of interest in text technology seems to coincide with the availability of personal computers in the early 1980s. When WordStar word processing software and printers with output of acceptable quality arrived in summer 1983, educators and other consumers at last had a viable combination of computing tools to enable self-publishing (Manes & Andrews, 1994, p. 190). The "access" issues that prompted typewriter development more than 100 years earlier had taken another step forward with the personal computer. While the relatively high investment remained a barrier for many, the prefabrication of page layouts with templates and style sheets would soon make it possible for even non-specialists to try their hands at publishing (Misanchuk, 1992, p. 2).

## Desktop Publishing for Instruction

Misanchuk notes the advent of these powerful publishing tools and the companion arrival of self-help texts to help explain their use. Unfortunately, says Misanchuk, most of these books have addressed desktop publishing (DTP) for brochures, flyers, and newsletters, and not the "desktop publishing for instruction" (DTPI) that is paramount to educators (p. 2). The problem with the general texts is that rules of thumb held sacred in DTP circles are either ill-founded from a pedagogical point of view or "have been shown through research to be counter-productive in an instructional situation." Indeed, Misanchuk's book, *Preparing Instructional Text: Document Design Using Desktop Publishing*, attempts to guide educators away from the "conventional wisdom" of DTP in favor of established principles of instructional design.

## The Zenith of Text Technology

As Apples and PCs appeared in ever-greater numbers in offices in the 1980s, cognitive psychologists and human information processing specialists were teaming with educational scientists and typographers to share discourse on the technology of text. It was the zenith of inquiry into text technology, as evidenced by the high number of citations from that era in this paper. A thorough search of more recent distance education literature shows that—save for Marland in Australia—little research has been published on text technology since that time. One can only speculate that researchers have either exhausted the topic or simply turned their attentions to delivering instruction via those computers on their desks. Whatever the reasons, this paper is a reminder of the ideas that sprang from those earlier inquiries.

## Hartley, Tinker, and Jonassen

In the early '80s, much of the inquiry on text technology was led by James Hartley, a cognitive psychologist in the UK who had joined forces with typographer Peter Burnhill (Hartley, 1982, p. 193). Earlier, across the Atlantic, Miles Tinker's *Legibility of Print* (1963) had been in print for some 20 years, having become standard reading for students of text technology. In recognition of the number of years since the University of Minnesota psychology professor published *Legibility,* this paper includes "34" tips, many drawn from Tinker's work. In addition, the contributions of Jonassen must be mentioned. In extending the work of Tinker and Hartley, Jonassen published two edited compilations on *The Technology of Text*, one volume each in 1982 and 1985. They remain, arguably, the most complete treatments on the topic to date.

## Designing and Writing for Effective Print-Based Learning Materials

As a survey article, this paper excerpts discussion from a variety of commentators. When the literature suggests consensus, the headings and text clearly show the advice. When issues are more ambiguous, comparative views are offered.

**1. Use a systematic instructional design model.** Gangé (1992) urges planners to employ an instructional design system for the development of materials. Such systems help designers to (1) identify outcomes of instruction, (2) develop instruction, and (3) evaluate the effectiveness of instruction (p. 21). Dick and Carey (1990) have developed and refined one such model, which today enjoys wide use.

**2. Analyze your audience and purpose.** Pace (1982) counsels writers to "develop a clear conception of the audience for which the text is intended." This includes having a picture of the audience's prior experience with similar texts, and thus what their expectations for this text might be (p. 24).

**3. Conduct pilot tests of materials.** With respect to formative evaluation, Gagné (1992) estimates that instructional materials could be improved 50% by conducting a few one-on-one evaluations (p. 30).

**4. Write in a direct, conversational tone.** Holmberg (1977) writes that the accessibility and effectiveness of texts are mainly dependent on four dimensions of the text character. (p. 76) These include the (1) simplicity of sentence structure and vocabulary, (2) structure and cohesion, (3) succinctness and relevance, and (4) additional stimulation. Writers can establish a conversational tone by using active verbs and short clauses, with short, well-known words.

**5. Write for simplicity.** Hartley urges writers to keep sentences to 20 words or less. Sentences with 30 to 40 words are "suspect." Sentences with more than 40 words should be rewritten or split into more sentences (Hartley, 1981, p. 18).

### Structured Content in Printed Distance Learning Materials

In line with cognitive psychology theory, text technology researchers also have directed their inquiries at the structure of text and the use of so-called embedded support devices (ESD) that aid learning. Sammons (1991) explains that structured content is aimed at engaging learners in "subject material at the level of critical analysis, synthesis, and application" to enhance comprehension and retention (p. 255).

**6. Prepare structured text.** Structured writing is a method for organizing categories of information and displaying it—both for learning and for reference. The emphasis is on "formats" which communicate quickly and which facilitate scanning and retrieval. (Hartley, 1985, p. 78) Horn (1982; 1985) has been experimenting with structured writing using the Information Mapping(r) writing service standards since 1965. The goals of Horns' methods are (1) to provide quick, reliable access so readers can find what they need, (2) to facilitate learning by accounting for individual learning styles, (3) to ease the writer's job by simplifying analysis, layout, writing, and revision, and (4) to provide the framework for design of computer-based storage and retrieval. (Horn, 1985, p. 180) At the core of the research Horn cites is the idea that writers should "predivide" information into chunks. Writers perform the chunking so that readers are relieved of the task (Horn, 1982, p. 355).

**7. Use advance organizers.** Advance organizers are narratives written at a moderate level of abstraction that serve to move the structure of learning materials into the learner's cognitive structures. Jonassen (1982) describes advance organizers as "scaffolds" that help learners incorporate new ideas at a suitable cognitive level (p. 259).

**8. Understand how structure enhances cognition.** Jonassen (1982) ascribes the aims of structured content to Ausubel's Subsumption Theory described in 1968. The theory holds that rote learning is more susceptible to forgetting, because it is not anchored to cognitive context. Information becomes more meaningful when learners can relate it to something already known.

**9. Write overviews.** Marland and Store (1982) describe overviews as "highly-condensed outlines which emphasize salient points" (p. 81). They familiarize students with the material to be presented.

**10. Use pretests.** Marland and Store (1982) also advocate use of pretests to help students judge what they already know about a subject and whether they have the prerequisites to acquire what is to be taught. Of equal importance is how pretests act as "access devices," orienting learners to the content (p. 83).

**11. State the learning objectives.** Objectives inform readers what they should be able to do when instruction is over. Stating learning objectives (1) provides teachers with clear guidelines for selecting instructional means and evaluative criteria, and (2) increases learner motivation and learning (Marland and Store, 1982, p. 84). The actual use of objectives by students, however, is likely to be "different from and more diverse than intended use," because of the "veto power" readers often exercise (p. 88).

**12. Account for how learners are likely to read.** In short, readers read in anything but a "linear, sequential progression" (Marland and Store, 1982, p. 97). Instead, they are "active participants," seeking information, rather than passively processing information.

**13. Insert questions to stimulate thought.** Factual questions, given at the beginning of a passage or before paragraphs of relevant material, often lead to specific learning. Questions given after content lead to more general learning (Hartley, 1981, p. 18).

**14. Use concept mapping.** Naidu and Bernard (1992) report that the use of concept mapping, where readers write hierarchies of related ideas, after prompting from in-text questions, often leads to stronger understanding and recall of course content than through the use of other ESDs (p. 230).

**15. Promote spatial learning.** Related to concept maps are what Merrill calls "structured outlines." Through decision trees, flowcharts, and decision tables, authors can present the steps for solving problems or accomplishing tasks (Merrill, 1982, p. 250).

## Page Layout and Typography

Felker et al (1985) point out that although authors might not see themselves as designers, good design decisions can make a tremendous difference in the comprehensibility and usefulness of a text (p. 55). Typography and page layout should complement the purposes behind the document and the structure of content. Typographic cues are of two kinds: (1) Spatial cues that guide reading through the use of spacing, and (2) Textual cues, such as typeface, bold face, and point size, which direct the reader's attention (Hartley, 1980, p. 116). In general, such cues are not primarily aimed at assisting comprehension. Rather, they exist to help readers "find their way around the text to make it more accessible." In short, they provide access points for readers (Hartley, 1980, p. 117).

**16. Use a practical page size.** Hartley (1982) notes that the foremost decision designers make when planning instructional text is choosing a page size for the document. From this all other decisions spring (p. 195). Variables include number of columns, column width, size of type, linespacing, and placement of page numbers. For print-based distance learning materials, an appropriate practical question to ask is whether the materials will fit into a mailbox (Marland and Store, 1982, p. 98).

**17. Design for reading gravity.** Lay out text and graphics to support "reading gravity," which in Western culture holds that readers are most comfortable viewing information that flows from top-left to bottom-right (Wheildon, 1995, p. 36).

**18. Use a single-column format**. A single column structure is preferable for standard page sizes, especially where text is broken by tables, graphs, and other illustrations (Marland and Store, 1982, p. 99).

**19. Justified text versus flush left/ragged right?** There is ample debate on the question of whether to fully-justify text or to justify only the left margin, leaving the right edge "ragged." While some commentators argue that ragged-right text retains "the optimal spacing between characters" (White, 1990, p. 66) Williams (1992) contends that justified type is more inviting to readers (pp. 45–46). The best course for designers might be to test samples of drafts with members of the intended audience.

**20. Use a line length of between 3 and 5 inches.** Line length, point size, and linespacing "must be coordinated in any final judgment concerning the legibility of type size" (Tinker, 1963, p. 73). The best choice for body text is 11-point type on 13-point linespacing [though 10- and 12-point type are nearly as legible]. For these point sizes, line lengths from 14-33 picas (3–5 inches) are suitable (p. 107).

**21. Set body text in 10-, 11-, or 12-point type.** Type sizes in the 10- to 12-point range are used for reading matter, and are classified as text sizes. Type sizes of 14 points or more are usually reserved for headings and are classified as display sizes (Kleper, 1987, p. 30).

**22. Use a serif font for body text.** More than five times as many readers are likely to show good comprehension when a serif body type is used instead of a sans serif body type (Wheildon, 1995, p. 60).

**23. Use a sans serif font for headings.** Sans serif typefaces, such as Arial and Helvetica, are more legible and are best used in headlines and subheads (Williams, 1992, p. 49).

**24. Set linespacing to 120% of the text's point size.** (e.g., 10-point type with 12 points of linespace)

**25. Use extra linespacing instead of paragraph indents.** Use vertical spacing to separate components of text, such as sentences, paragraphs, and headings (Hartley, 1985, p. 27).

**26. Use bold and italic type cautiously**. "Use italic and bold as you would rich desserts—they're fine occasionally, but easy to overdose on" (Williams, 1992, p. 53).

**27. Avoid setting words in all capitals.** "We recognize words by their shapes as well as by their letters. If you set text in all caps, all words have the same shape" (Williams, 1995, p. 14).

**28. With color, communicate, don't decorate.** Use color to communicate, not "decorate," says White (1990). Black type on a white background offers the best contrast (pp. 74–77).

**29. Take care of widows and orphans.** A *widow* is a paragraph that ends and leaves fewer than seven characters on the last line (Williams, 1992, p. 37). An *orphan* is a widow line that breaks alone to the top of a new column or page (p. 38). Authors can rewrite text or rebreak lines to repair them.

**30. Break lines wisely.** If you choose to use hyphenation at all, avoid more than two hyphenated lines in a row and too many hyphenations in any paragraph (Williams, 1992, p. 39). Never hyphenate headings, but do break headings sensibly to preserve "logical grammatical sections."

**31. Number pages with a purpose.** Authors can number pages consecutively or chapter-by-chapter. When page changes are unlikely, Misanchuk (1992) supports numbering pages consecutively. However, chapter-style numeration minimizes the impact of page corrections on repagination (p. 99).

**32. Use suitable punctuation.** Use typographical quotes and apostrophes, not inch or foot marks. (Williams, 1992, pp. 15 and 17) Don't use punctuation to end headlines (Wheildon, 1995, p. 120).

**33. Avoid underlining.** Use italics instead. "Underlining is for typewriters" (Williams, 1992, p. 25).

**34. Avoid reverse type**. "Printing text in reverse type undermines reading comprehension. Fewer than half the number of readers will easily understand the message" (Wheildon, 1995, p. 102).

## "Chunking" in the Age of the Web

This paper suggests that the ideals described above apply equally well to the formatting of online text for the Web. Echoing Horn, authors Milburn and Burdman urge Web writers simply to "Keep your text short and break up long pieces into short chunks" (p. 85).

Following the principles of structured writing, as advocated by Horn and others, would seem to position print-based writers well for the subsequent conversion of their materials to Web format. Using chunking strategies, authors can write small modules of text that can be used either in print or online. Once saved in Web format, these units can easily be hyperlinked topic-to-topic.

As authors of print-based distance learning materials brace for the next round of technology competitors, their acumen and skill as page designers can't help but positively influence the design and development of materials for other media. Not that print-based distance learning materials will be disappearing any time soon. As Pittman noted a decade ago, the convenience and economy of this "old technology" will encourage the continued persistence of print for generations to come.

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### Autobiographical Sketch

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# Using Interagency Collaboration and Combined Technologies to Deliver a Rural Teacher Certification Program

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The Collaborative Early Childhood Special Education Project (CECSEP) was instituted in 1995 to address the critical need for personnel qualified to serve young children with disabilities in rural areas of Utah. Two Universities and the State Office of Education are partners in this project. This session summary describes (a) the process of inter-institutional and agency collaboration which created the Project, (b) the instructional model upon which it operates, (c) student evaluation data, and (d) key issues involved in the development and implementation of the program. This description of is intended to help others to determine how the model may be useful in their own personnel preparation efforts using distance education technologies.

### The Need for a Collaborative, Distance-Based Project

In 1993, only 29% of rural personnel in Utah who served with young children (ages birth to five) with disabilities possessed the proper certification. The State Office of Education requires that teachers serving this population compete a teaching certificate in this area or be enrolled in an approved program of study. The issue for rural professionals was that of access to one of the two institutions in the state that could recommend personnel for this specialized teaching certificate; both are in the northern part of the state. For many students, travel from their home to campus would require a five to eight hour drive, one-way. In response to this critical shortage of qualified personnel Utah's State Office of Education approached both institutions of higher education (Utah State University and the University of Utah) that prepare personnel for this certificate. On campus coursework offered during the academic year or in the summer was deemed inadequate to serve the needs of this nontraditional student population. Clearly the solution would be to offer courses through distance media. Neither university was in a position to mount an additional distance certification program alone; however, both indicated their willingness to allocate limited resources if a coordinator were hired to (a) oversee inter-institutional agreements, (b) recruit and advise students, (c) schedule coursework with the State-run distance system, and (d) keep all members of this consortium abreast of program implementation and evaluation. As a result of these commitments the State Office allocated funding for one year to hire a half-time coordinator to develop the program, secure university agreements, and submit federal and state grant proposals to support the project. Faculty associated with each institution worked with the coordinator during the planning year.

## The Collaborative Process

To begin the process, personnel from each university formed an advisory board to work with the coordinator. Establishing this board was critical to the success of the planning process, as board members understood how their own university and departmental faculty might react to issues such as specific curricular sequences, acceptance of course credits from other institutions, and working procedures proposed for the Project. The first step of this project was to formulate a curriculum based on courses delivered at each university and whose content and quality met the standards for state certification. This curriculum , along with admissions and registration procedures, was presented for approval to the faculty of the respective Special Education departments of each university. The "front-end" work of the coordinator and advisory board resulted in approval with only minor alterations to student procedures and no alterations to the approved coursework each university would deliver and accept. Faculty of each institution secured any necessary approvals at higher administrative levels.

During this planning year three other important collaborative activities occurred. First, student recruitment was addressed by reviewing certification and employment records of the State Office of Education. Preschool personnel currently working without proper certification in school districts were informed of the approved distance certification program. Through this process the first cohort of students was identified. Subsequently, the Project coordinator developed a course schedule with faculty input from each university and submitted site requests to the statewide distance-education system. (Called EDNET, this is a fully interactive television closed circuit broadcast system with 52 sites across Utah.) Finally, two proposals were submitted to support the conduct of the Project. Both were funded. A grant from the state system of Higher Education's Technology funded technology enhancements such as the creation of a project website, CD-Rom and video supports to the curriculum and course adaptations for distance delivery. A grant from the U.S. Department of Education Office of Special Education and Rehabilitative Services (#H029Q50031) provided support for students to complete the program. The State Office of Education provided continued fiscal support for the Project coordinator, site facilitators, and local travel. The CECSEP Project is now beginning its third year of delivering courses to residents of rural Utah. Throughout the inter-institutional process the advisory board (faculty from both universities and the State Office of Education) receives quarterly reports from the Project coordinator. Over 85 students have been advised in a program of study. Almost 50 are actively taking courses each quarter.

## The CECSEP Model

Table 1 displays the courses that each university contributes and the distance delivery systems that each utilizes. Students are required to have an Internet connection and email account. Project staff are available to assist students in finding access to hardware and an Internet service provider and provide technical help to teach them to use email, send attachments, and use Internet browsers and search engines. This is critical to link all students to their advisor, instructors, and peers. Access to the Internet is necessary for students to access the Project website (<http://www.coe.usu.edu/coe/cecsep>). On the site students find specific course information (such as course modules, a midterm, or a handout), links to other sites and CECSEP students, advisement notices, and scholarship procedures. Students use email to submit course assignments, receive instructor feedback, and for general Project communication. Email also provides students at a distance with peer to peer support and information.

**Table 1: The CECSEP Delivery by Participating Universities**

| Content of CECSEP Coursework | Distance Delivery System |
|---|---|
| Core of Early Childhood Special Education—Utah State University (27 credits) | EDNET delivered courses (5 courses). These are fully interactive televised broadcasts. Curriculum supports include Videodisc, CD-ROM, Internet, and email.<br>Individual correspondence (2 courses) with distance faculty responsible for course. This would include videos and CD-ROM to support the curriculum as well as, Internet assignments and email with the instructor. |
| Foundation of Special Education—University of Utah (21 credits) | Site based facilitators (all courses) use video from on-campus courses, interact with groups of students and university faculty.<br>Individual correspondence (when groups not possible) with distance faculty responsible for course. This would include videotapes of on-campus course. |
| Supporting courses for the major (e.g. child development, abuse and neglect)—various Colleges and Universities (20 credits) | EDNET<br>ComNet (USU interactive audio one-way video)<br>Home Study<br>Institution nearby with comparable course |

Four of the five core classes in early childhood special education offered by Utah State University are delivered using a "module" format in conjunction with the fully interactive EDNET system. Figure 1 shows the instructional composition of modules Instructors did not want to use the interactive televised sessions to deliver basic content, but rather, to permit student's to engage in application or integration exercises. Thus, to maximize the interactivity possible within each session, courses were adapted so that students would demonstrate proficiency in basic knowledge prior to the broadcast time. This allowed the instructor to devote class time to engaging students in activities that required interaction with each other pursuant to application of the content of the course.

### Student Evaluation

Quarterly evaluation data from students who have taken Project courses over the past two years indicate high levels of satisfaction. Table 2 presents a summary of these data. The high ratings were unanticipated since most students are required to participate in this certification program or risk job loss. Project directors anticipated a greater degree of dissatisfaction since students are required to participate. All evaluation data is used to modify coursework. Criticism of Project coursework generally centers around the amount of work required, or the time required to obtain feedback regarding applied practicum assignments. It is interesting to note that students indicate, by their ratings, a greater preference for EDNET courses than those taken through correspondence, another frequently used medium of distance education. It was anticipated that nontraditional students would prefer greater control over their coursework, however, they may demonstrate preferences for interaction with their colleagues or a greater degree of structure provided by the instructor. Anecdotally, students have indicated that although the EDNET "module" courses are more time consuming and labor intensive than traditional lecture courses, they learn more from the module format. This may be explained by the application exercises. It is not feasible to introduce such exercises into courses where basic content must be delivered during the class sessions.

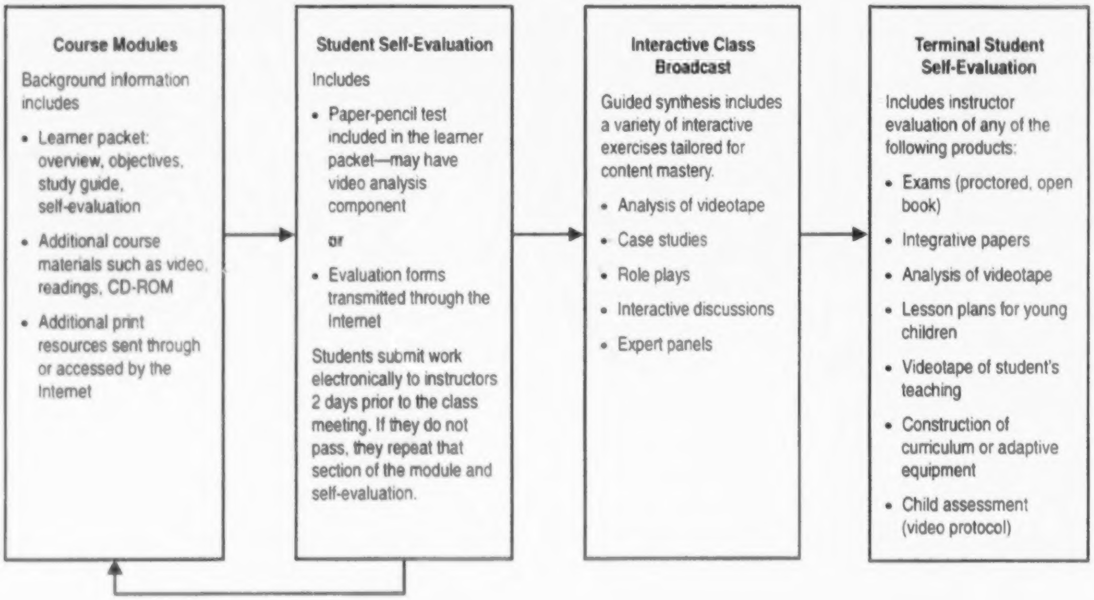
Course Modules
Background information includes
Learner packet: overview, objectives, study guide, self-evaluation
Additional course materials such as video, readings, CD-ROM
Additional print resources sent through or accessed by the Internet
Student Self-Evaluation
Includes
Paper-pencil test included in the learner packet—may have video analysis component
or
Evaluation forms transmitted through the Internet
Students submit work electronically to instructors 2 days prior to the class meeting. If they do not pass, they repeat that section of the module and self-evaluation.
Interactive Class Broadcast
Guided synthesis includes a variety of interactive exercises tailored for content mastery.
Analysis of videotape
Case studies
Role plays
Interactive discussions
Expert panels
Terminal Student Self-Evaluation
Includes instructor evaluation of any of the following products:
Exams (proctored, open book)
Integrative papers
Analysis of videotape
Lesson plans for young children
Videotape of student's teaching
Construction of curriculum or adaptive equipment
Child assessment (video protocol)

*Figure 1. Instructional design of module courses*

## Key Issues

As the CECSEP Project enters its third year of course delivery, it addresses issues that pertain to effective (a) collaboration, (b) instruction, and (c) evaluation. First, collaboration was enhanced because important stakeholders were identified early and involved from the beginning. Also, the State Office of Education provided fiscal support for planning and development. In the absence of this initial support crucial procedures could not have been developed and agreements would not have been articulated across institutions. Ongoing communication keeps all parties apprised. Key issues in instructional design center on adapting courses and technology supports. Making alterations to on-campus courses for distance delivery is a labor intensive process. However, it is important to attend to pedagogical differences between direct and distant courses as well as to the different instructional needs of on-campus and off-campus student populations. A central issue in the instructional program has been the available technology supports. Instructors need someone to turn to when technology turns on them. Distance students need assistance to access hardware and learn how to use electronic supports such as the Internet and email. The CECSEP project was able to help instructors and students because of external funding for a half-time technology specialist. In the absence of such personnel the project could not have developed the high levels of interaction that are now part of a daily routine. Quarterly student evaluations support that a key issue for students is interaction with others. Their highest ratings of satisfaction occurred for courses with the greatest levels of synchronous interaction. Given a choice of distance delivery systems, instructors may benefit using those with superior interactive capabilities.

**Table 2: Student Evaluation of Early Childhood Special Education Coursework**

| Delivery | Course Title | Student Number | Percentage of Positive Ratings |
|---|---|---|---|
| EDNET | Practicum with Infants and Families (Su '95, '96) | 10 | 98% ("excellent," "very good," or "good") |
| | Practicum in the Least Restrictive Environment with Family Service Plans I (F '95, '96) | 18 | 84% ("excellent," "very good," or "good") |
| | Practicum in the Least Restrictive Environment with Family Service Plans II (W '96, '97) | 17 | 85% ("excellent," "very good," or "good") |
| | Methods and Materials for Educating the Young Child with Disabilities | 17 | 89% ("excellent," "very good," or "good") |
| | Adaptive Equipment and Communication Technology for Young Children with Disabilities | 21 | 91% ("excellent," "very good," or "good") |
| Correspondence | Teaching Infants and Young Children with Disabilities | 15 | 74% ("What I expected," "appropriate," "very helpful," and "helpful") |
| | Teaching the Young Child with Disabilities in the Least Restrictive Environment | 12 | 79% ("What I expected," "appropriate," "very helpful," and "helpful") |

## Autobiographical Sketches

**Cynthia Rowland** is co-director of the CECSEP project. It serves over 80 rural educators across Utah. She has developed procedures for instruction and supervision at a distance and for teaching students from different professional disciplines procedures of collaboration. She has more than 15 years' experience in service to children with disabilities and their families and in teacher education. Her research includes evaluation of a videodisc-assisted curriculum to teach procedures of naturalistic instruction to early intervention personnel.

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**Sarah Rule** is Associate Director of the Center for Persons with Disabilities, a University Affiliated Program at Utah State University. Her work in distance education includes procedures for using interactive television to provide technical assistance to classroom personnel and an analysis of the costs of using distance media for training and technical assistance. She has more than 25 years' experience in teacher education, curriculum development, and service to children and families with disabilities or who are at risk.

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# A WWW-Based Learning and Discussion System

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## Abstract

A WWW-based Learning and Discussion System is presented. It is designed on Client/Server structure. This WWW-based Learning and Discussion System combines the advantages of traditional education and networking communication. It shows specifications such as more efficient communication, better multimedia support, more friendly user interface and so on.

## Introduction

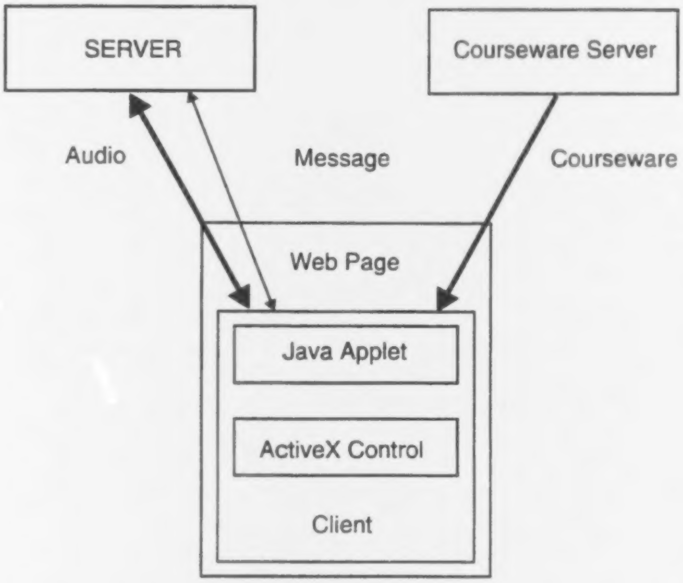
The fast development and maturity of the computer network technology make Internet an alias of our information age. Today's Internet has become a quickest information-exchanging and richest information-possessing media. More and more people get information through Internet, study and communicate by the network. In a sense, Internet has become the largest school in the whole world. It gradually influences and changes the traditional teach-modes. And such Internet improvement is just represented by the research and development of "Distance Learning."

As a typical application on information network, Distance Learning is one of the most active domains in Internet research. Not only has it absorbed the advantages of traditional teaching methods, but also it fully takes network's superiority of using remote resources. The flexible learning method and the plentiful media modes lead to unparalleled merits of Distance Learning.

The technical project of Distance Learning Research is concerns how to implement normal teaching procedure (giving courses, testing and evaluating, communication and discussion, etc.) on network and how to utilize the net to greatest extent, including the expression of information, conveyance, security, efficiency and how to apply these to various aspects of teaching. The WWW-based Multi-user Learning and Discussion System we present here is such a system with functions of Distance Teaching, communication and discussion.

## The Technical Routine of the Multi-User Learning and Discussion System

Our system is based on WWW and takes advantages of the Client/Server model. Server program residing on the server and client program is Java applet and ActiveX applied program which inserts Web page on client.



The reasons that we use such a system structure are as following:

- WWW is the most popular platform on Internet and has the greatest potential in future. From the view of most personal Internet users, Internet is the synonym of Web. WWW is an opening and standard environment. It not only changes everything into a multimedia form (picture, video, and animation) for browsing, but also takes largest usage of other network services. Original interaction on WWW mainly depends on CGI, but new technologies, such as Java, Java Script, ActiveX, emerged with the fast development of WWW. Now WWW has very powerful interactive ability and is most suitable for some applications that have high demand for communication.

- Client/Server Structure lightens the burden on the Server side and reduces data exchanges on the network. It is also helpful to system maintenance and security administration.

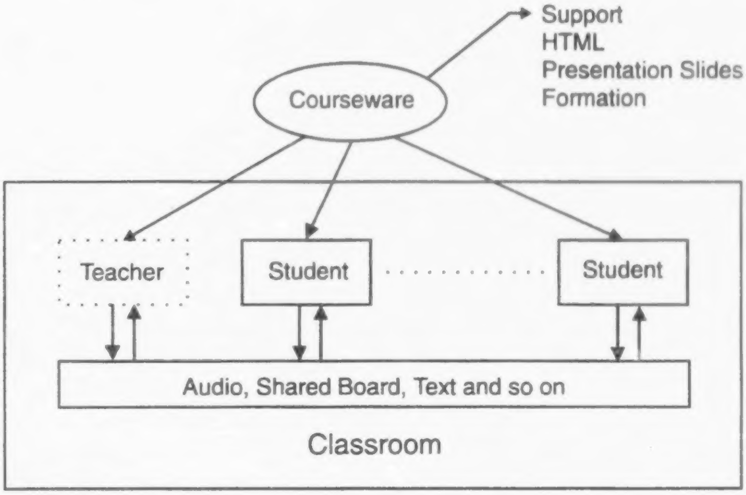
- The main part of client program is Java applet applied program because Java is a language of platform-unrelated, inborn security and multi-thread support. Java now is the most popular Internet language, which can be in motion in the browser program no matter what machine or operate system it is on. But since Java lacks strong support for Multimedia and Collaboration, we apply ActiveX to implement voicedata collection, compression and broadcasting. Thus Client port is realized by both Java and ActiveX technology.

- WWW can be easily used and applet supports GUI, so the Multi-user Learning and Discussion System provides Client port with excellent user interface.

### Functions Implemented on the Multi-User Learning and Discussion System

The WWW-based Multi-user Learning and Discussion System can be divided into one Sever port and three kinds of Client ports. These Client ports are Student port, Teacher port and Courseware port. They can be run on the browser to let students take courses, let teachers give courses and let administrators manage courseware.

The main function lies in learning and discussion. The whole system organizes students and teachers in units of classrooms. Users are divided into groups according to related classrooms. We have two kinds of classrooms: Course Giving Classroom and Self-study Classroom. Users can be authorized to access these classrooms for different purposes. Every classroom is in charge of one course, which supports forms such as HTML, Presentation Slides and so on.



In Course Giving Classroom, teachers make the decision of learning process. Teachers give courses and raise questions through voice effect, text conversation, Whiteboard share, etc. Students study by browsing courseware and listening to teachers. Also, students can contact with teachers by text conversation and raising "hands," send application for delivering statements and using White Board.

In Self-study Classroom, while teachers are absent, students determine the learning process according to individual situation. They can communicate and discuss with students in other classrooms also through voice effect, text conversation, Whiteboard share, etc. When encountering difficulties, students can hold questions for teachers to handle.

The system provides three main communication methods: voice communication, Whiteboard share and text conversation. They support the following functions:

- Voice communication supports real-time sound transmission. In one user group, only one user can deliver his statement in one moment, others should listen to the broadcaster. The system is responsible for granting and regaining the power of delivering statements.

- Whiteboard share permits user groups to communicate by sharing the Whiteboard. It supplies text editor and drawing operations, such as line, circle, ellipse, rectangle, paintbrush, etc. with variable width and colors. Users also can paste picture onto Whiteboard. Here also involves the authority problem and the system is responsible for granting and regaining the using right.

- Text conversation supports broadcast talk and individual talk. If it is an open discussion, each user can deliver his statement to every other online user. If it is a private discussion, users can choose several partners, then the statements will only be delivered to those appointed partners.

## The System Realization

### Assignments of Server Port and Client Port

The whole system is based on Client/Server structure. Followings are the main tasks of Sever.

- Monitor and connect Client by socket. Server sets up two threads for every Client, one thread is responsible for receiving and transferring messages from users and the system, and the other is responsible for receiving and transferring voicedata.

- Maintain the security of the system, affirm user's identification and access authority. Make sure the normal operation of the system.

- Deal with the system requests, for example, handle the application of build a new classroom for users. Server also need to maintain system messages such as the status and attributes of classrooms and users.

Followings are the main tasks of Client:

- Set up connection with Server, finish user's identification confirmation and get the corresponding user-authority.

- Send out messages of the user's behavior and status to Server, let Server process the messages and transfer to other appointed users. Meanwhile, Client receives messages from Server and deals with them.

- When the user is delivering his statement, Client fulfills the task of voicedata collection, compression and transmission. When the user is listening to other's statement, Client fulfills the task of voicedata receiving, decompression and replaying.

- According to the teacher's guidance and the user's own requirement, Client downloads teaching notes from Server and displays the notes in the explanation area.

**How to Realize Server Functions**

Server program consists of one system thread and two groups of user threads. System thread is network_monitor_thread. User threads include message_process_thread and voicedata_process_thread. Following are the structures of these threads.

```
network_monitor_thread:
if (one client connects to server)
then
    begin
       if (this client is a registered user)
          create a new message_process_thread;
          create a new voicedata_process_thread;
          add message_process_thread to message_process_thread_list;
          add voicedata_process_thread to voicedata_process_thread_list;
       end if
    end
end if
if (one message_process_thread exists)
then
    begin
       stop the homologous voicedata_process_thread;
       remove the message_process_thread from message_process_thread_list;
       remove the voicedata_process_thread from voicedata_process_thread_list;
    end
end if

message_process_thread:
while (TRUE)
do
    begin
       receive message from client;
       if (the message needed to be handled by server)
          handle the message;
       end if
       transmit the message to homologous message_process_thread;
    end
end while

voicedata_process_thread:
while (TRUE)
do
    begin
       if (in speak mode)
           begin
              receive voicedata from client;
             add voicedata to voicebuffers;
           end
       else if (in listen mode)
```

```
            send voicedata to client;
        end if
    end;
end while
```

### How to Realize Client Functions

Client port contains two threads: message_process_thread and voice_process_thread. User inputs and interactive activities will be turned into message packages which have fixed form by message_process_thread, and this thread is also in charge of transmitting message to Server port program, receiving these message package from Server port and turning it into real operation. Voice_process_thread determines whether the procedure is collection-compression-transmission or receiving-decompression-replaying according to the current status.

```
message_process_thread:
while (TRUE)
do
    begin
        if (some message need to be send)
            send the message to server;
        end if
        receive the message from server;
        analyze the message;
        execute the corresponding operation;
    end
end while

voice_process_thread:
while (TRUE)
do
    begin
        if (in speak mode)
            begin
                input voice;
                compress the voicedata;
                send voicedata to Server;
            end
        else if (in listen mode)
            receive voicedata from Server;
            decompress the voicedata;
            output voice;
        end if
    end;
end while
```

### Message Transmission and Process

In the system, there are three types of data-exchange between Server and Client: voice, courseware and message. The whole system's operation is based on message, so the contents of message and message processing are especially important factors in the system.

Following are main roles of message in the system:

- Client requests Server by message, Server handles requests and sends result back to Client by message.
- If status of a Client or the system alters, message will be broadcast to inform other clients to synchronize status.
- User's text conversation and Whiteboard operation are converted into message and send out to other online users, thus implement the communication through text and Whiteboard.

In the system, Server often simply relays message to Client and lets Client finish handling the message, which lightens the burden on both network and Server.

### Technical Details of Implementation

Now Internet Explorer 3.0 is a browser supporting both Java and ActiveX, and Visual J++ is a develop tool supporting both Java and ActiveX. They are both products of Microsoft Co. We apply both Java and ActiveX to our system, involving the communication and interaction between Java and COM.

Following is the main methods:

**Control Java applet by scripting**. In this situation, Java applets is just like ActiveX controls. Script can read/write public variables of applet and call applet's public member functions. You can insert Java applets and Active Controls in one page simultaneously by setting up connections between them through VBScript's message process. For example, you can get values from ActiveX Control and allocate them to Java applet. The restriction of such method is that scripting language can only directly access the subclass inherited from Class applet. If you need to access other classes of applet, you must define related public-access functions in subclasses inherited from Class applet.

**Quote COM objects in Java source code.** To use COM objects in Java, we need to introduce them in Java. A Java Class representing such COM Classes must be generated first. Visual J++ provides Java Type Library Wizard in order to produce Java interface for COM objects. After that, we can use this Java Class in program just like other classes. When using this Java Class, we cannot use the instance of the Class directly but should use it through the interface.

**Connect Java applet and OLE control.** There are two basic methods for connecting Java applet and OLE control. One is to transfer events generated by OLE control to Java applet and let Java applet finish handling such events. The other is very similar to the second item above: it must generate a Java Class to represent this COM Class and introduce such class into source codes. This method does have difference from the second item. It doesn't produce instances of the Java Class but transfer an OLE Control quotation as parameters to Java applet when HTML pages are initialized. Thus Java applet can use this OLE Control.

**Output Java class as COM class.** Besides COM objects are permitted to use in Java program, Internet Explorer supports Java to output Java functions as COM service outputs. Then you can use Java to develop COM objects.

## Conclusion

In this paper, a WWW-based Multi-user Learning and Discussion System is introduced. The system makes it possible for users from various areas to study coordinately. It takes full advantages of traditional education and network communication. The interface is natural user-friendly. With communication means of voice, text, Whiteboard, discussions among users are also very convenient. Current Client port is developed by Java and ActiveX, and it can be only executed on Internet Explorer 3.0. After functions of Java language are further improved, we will develop the whole system just by Java to implement the real multi-platform.

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## Autobiographical Sketch

**Shen Ruimin** is an associate professor of Dept. of Computer Science of Shanghia JiaoTong University, director of the Distance Learning Center which is jointly sponsored by Shanghai Education Committee and Shanghai Jiao University. He is in charge of nation's Ninth Five Year Plan in distance learning and two international cooperation project—Intel Research Grant and Taiwan Yuanzhi Institute Research Fund.

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# The CLASS Project After Year One

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In August, 1996, at the 12th Annual Conference on Distance Teaching and Learning, the CLASS (**C**ommunication, **L**earning, and **A**ssessment in a **S**tudent-centered **S**ystem) Project had its first public unveiling. At that time the project was four months old and funded to the level of $2.5 million. Today, at the 13th Annual Conference on Distance Teaching and Learning, the project is 16 months old and funded to a level of more than $20 million. This presentation will describe what the intervening year was like in terms of funding, partnering opportunities, and, most importantly, course development. We will demonstrate the latest version of four courses which will be available for open enrollment as of September 1, 1997. To summarize the presentation, it has been a year not without its challenges and its excitement. To illustrate this point, the presentation will be divided into four parts: The Project, The Partners, The Courses, and The Future.

## The Project

The CLASS Project's goal is to make available on the World Wide Web an entire, accredited, high school diploma sequence. To earn an accredited high school diploma a student must successfully complete 40 courses or 200 Carnegie units. When completed in 2001, CLASS will have available to students 54 courses from which to choose to complete these requirements.

The Department of Distance Education of the University of Nebraska—Lincoln is uniquely suited to provide this diploma sequence. Among its units is the Independent Study High School (ISHS). The ISHS is the only university based, fully accredited, independent study high school in the United States. In operation since 1929, and accredited by both the North Central Association of Colleges and Schools and the Nebraska Department of Education, the ISHS currently serves about 15,000 students annually in 136 countries. The students can choose among 138 primarily print-based courses. Enrollment is open, with students registering throughout the year.

The uniqueness of, and the long record of success of, the ISHS was recognized by various governmental funding sources. The first funding, beginning in March, 1996, for the CLASS Project came from the federal General Services Administration for a proof of concept project. In July, 1996, the ISHS was notified that it had been awarded a Star Schools grant. This was a five year win with first year funding, beginning on October 1, 1996. The ISHS was subsequently notified that it had been approved for second year funding also. Other funds, for the technology invention side of the project, came from various components of the

United States' intelligence community including the Central Intelligence Agency and the National Reconnaissance Office.

## The Partners

While the University of Nebraska—Lincoln's ISHS is the recipient of the federal funding and is considered "prime" in the project, the subcontractors are truly viewed as partners rather than hired help. Without the active and enthusiastic participation of Nebraska Educational Telecommunications (NET) and the Sarnoff Corporation, the project would not be as unique and robust as it is. The Department of Distance Education could and would develop the curriculum for the courses, but other expertise was needed.

Nebraska Educational Telecommunications is a unique entity in that it is jointly sponsored by both the University of Nebraska and the state of Nebraska. It also has an entrepreneurial side which develops funding for special projects. Taken altogether, NET is a premier public broadcasting and telecommunications operation. NET's history includes the production of several award winning programs, the most recent of which is *The Reading Rainbow.* NET is the course production partner for the project.

The Sarnoff Corporation of Princeton, New Jersey, formerly RCA Labs, has a history of technological innovation that includes the invention of color television and the set top box for direct broadcast satellite delivery. Sarnoff is also the technology partner in the Grand Alliance, the American consortium that has recently, successfully, established the standards for HDTV. Among the units of Sarnoff is the National Information Display Lab (NIDL), a world leader in softcopy technology. NIDL is the technology invention partner for the project.

A third partner, and one that is listed no where in any of the grant proposals, is Senator J. Robert Kerrey (Dem. NE). Senator Kerrey has been a long time champion of the ISHS and fully supported its move into this digital world. He has provided introduction to various funding sources and potential partners. He has offered advice, inspiration, and, at times, direction for the project. It is fair to say that without Senator Kerrey's involvement the CLASS Project would not be where it is today.

## The Courses

The development of the courses for this project first required the recognition of several factors. Paramount among these was that the World Wide Web offered a new, and different, method of delivery. Therefore, we could not take our print-based courses and simply dump them onto the Web. Secondly, in order to fully utilize the potential of the Web as an educational delivery system there would need to be new software and technologies developed. Thirdly, and premised on the first two points, production of these course would take place in a manner different than traditional multi-media production. To put it in a simple, declarative sentence, the project would require invention in both the area of instructional design and the area of technology.

A major development issue was how to structure the course teams both within and among each of the partners. Another question involved how to schedule the tasks. Under the Star Schools grant the ISHS agreed to produce 10 courses each year for five years. We had to determine what courses we would produce in each year, what the schedule for delivery of those courses to NET, the production partner, would be, and all of this had to be tied to a technology invention schedule. Thus we were in the process of inventing instructional design strategies tied to not yet available software and agreeing to have courses ready for production by specific dates. It made for an interesting year.

Each of the partners was entering a realm in which it had not previously existed. New positions had to be defined and filled. Cooperation and collaboration had to take place in new venues and with and between people who previously had not worked together. There were clashes of culture. Educators and technologists do not always speak the same language or operate on the same clocks. The world of the academy and the world of private enterprise do not always share similar values, beliefs, and practices. Introduce the federal government and the mixture gets even more interesting. All this had to be addressed and solutions, compromises, and accommodations had to be arrived at.

The best way to illustrate how this development progressed is to demonstrate some of these inventions from the four courses that will be open for enrollment beginning on September 1, 1997.

## The Future

I stated last year at this conference, and will repeat it this year with even more fervor, the CLASS Project will never be "finished." The possibilities for CLASS instructional design and technology range across the spectrum of lifelong learning.

During the past year we have met with representatives of the military, intelligence, retail, research and development, governmental, and educational communities. The interest in, and recognition of the potential of, CLASS is overwhelming. Perhaps our biggest challenge to date has been providing reality checks for those who want to move too rapidly or in too large a fashion.

Our expectation is that the University of Nebraska—Lincoln will partner with various private sector companies to exploit the potential of this interest. At the same time, the university will be employing the expertise it has developed in this project to move into the development of courses for the post-secondary market. The Department of Distance Education will continue to seek funding to convert more of its courses to the CLASS format. At the same time, the department will expand the kind of services its offers to both internal and external clients.

So, the CLASS Project continues. I am confident that, if we were to come back each year to this conference, we would have more news to share and more adventures to relate. In the Department of Distance Education at the University of Nebraska—Lincoln we used to say that "once the dust settles we will . . ." We have come to recognize that the dust will never settle and we are in for an exciting ride.

## Autobiographical Sketches

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# Design Considerations in Converting a Standup Training Class to Web-Based Training: Some Guidelines From Cognitive Flexibility Theory

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## Theory

Cognitive flexibility theory focuses on the nature of learning in complex and ill-structured domains. Spiro & Jehng (1990, p. 165) state: "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands. . . . This is a function of both the way knowledge is represented (e.g., along multiple rather single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)."

Cognitive flexibility theory is based on the constructivist theory of learning. It is premised on the idea that many—if not most—knowledge domains are complex and ill-structured. It attempts to solve known problems of learning failure and learning transfer (Spiro et. al. 1991).

Jacobson outlines the features of cognitive flexibility theory: complex knowledge may be better learned for flexible application in new contexts by employing case-based learning environments that include features such as: (a) use of multiple knowledge representations, (b) link abstract concepts in cases to depict knowledge-in-use, (c) demonstrate the conceptual interconnectedness or web-like nature of complex knowledge, (d) emphasize knowledge assembly rather than reproductive memory, (e) introduce both conceptual complexity and domain complexity early, and (f) promote active student learning (Jacobson, Maouri, Mishra, Kolar, 1996).

Spiro et. al. (1991) outline a number of features of the theory: 1. the importance of multiple positions of instructional content, from multiple organizational schemas for presenting subject matter to multiple representations of knowledge, 2. importance of students' active participation, 3. revisiting the same material at different times in rearranged context for different purposes and from different conceptual perspectives, 4. avoid oversimplification.

Further, the theory suggests a crisscrossed landscape via a nonlinear and multidimensional traversal of the complex subject matter (Spiro et. al. 1991). The Internet and hypertext/ hypermedia are particularly suitable for applying cognitive flexibility features because the media easily supports presentation in multiple perspectives and knowledge crisscrossing (Spiro et. al. 1991, McManus, 1996).

Technology environment such as the Internet can present the learning with the world in its natural complexity; rather than simplifying situations or tasks, an on-line environment can embed the learning in the real-world situations, (Jonassen) "We believe that hypertext is among the best examples of constructivistic learning environments, because acquiring knowledge from hypertext requires the user to engage in constructivistic learning processes.

Learning from hypertext is task driven. It depends largely on the purpose for using the hypertext, which in turn drives the level of processing" (Jonassen). He says that cognitive flexibility theory is and effective way for accomplishing the goals because it is case-based and involves meaningful world tasks.

McManus (1996) developed a Hypermedia Design Model based on Cognitive Flexibility Theory. The steps of this design model different from tradition instructional design: 1. Define the learning domain, 2. Identify cases within the domain, 3. Identify themes/perspectives to be highlighted, 4. Map multiple paths through cases to show themes, 5. Provide learner controlled access to cases, 6. encourage learner self-reflection.

Rationale: Cognitive Flexibility Theory as proposed by Spiro, Feltovitch, Jacobson and Coulson (1991) is a constructivist theory which argues that the complexity of real world situations, the "ill-structuredness" of most knowledge domains, and the failure of transferring learning in traditional ways poses serious problems for traditional theories of learning and instruction. While the traditional theories may be applied to novice learning, almost opposite techniques are required for learners to develop the cognitive flexibility to apply learning to complex, unrelated real life situations in more advanced learning.

In order to achieve this cognitive flexibility, the learning theory leads to an instruction theory which calls for flexible learning environments that require multiple representations of items, repetition, active learner involvement, avoidance of oversimplification of content, situated cases, and multiple interconnections. "We have called the instructional theory that is derived from Cognitive Flexibility Theory and applied inflexible computer learning environments Random Access Instruction" (Spiro et. al. 1991). This type of learning/instruction is particularly enhanced/facilitated by the capabilities of computer technology delivery and, in particular, hypertext.

My product deals with an "ill-structured domain," i.e. the federal government process. While, in its simplified form, it might appear that knowing the steps of the government process is pretty linear and straightforward and not ill-structured at all. However, Cognitive Flexibility Theory says precisely that over-simplification leads to lack of transference. Even though in context this product is a "basic" class, the fact is that learners must use the information for complex job tasks—such as answering customers unpredictable questions for information of all sorts, analyzing and writing about current developments in government or researching specific cases. In this setting, then, the traditional high school government or civics course could be considered the "novice" level learning, in which the structure is simplified. But in this "basic" class the principles of ill-structuredness and complexity apply.

Because the theory is concerned with addressing failures of learning transfer through oversimplification and over-structuring, I am particularly interested in its application to our training for employees to understand the federal government process. While the principle of learning transfer may not apply per se—Our employees don't need to memorize the steps in the government process—they must have a degree of knowledge of the structure of the domain to be able to quickly go to specific information they need quickly. They need to know how to apply the information in specific job situations that are very diverse: A reporter needs to know the underlying process in order to analyze a current event, devise probing reporting questions, gather the proper data, talk to the right sources. A research person needs quick retrieval abilities of specific data when faced with a customers questions or access to phone numbers or organizational charts to determine where to get the information. A clerical may need to have a mental model of the structure for filing data related to publications content. A sales person may need only a quick outline of information to field customer questions and understand basic publication content for a wide variety of publications. So, the goal is NOT to be able to recite the steps of the process, rather use it as a tool to analyze and gather appropriate additional data and apply it to judgments about the worth and usefulness and likely next steps of that data for our subscribers.

The case study approach applies to the way users use the knowledge, since on-the-job use is always a different "case" pertaining to the federal government process. I did not use it as the instructional model, however, since it would simply take too long. I found with our users since they have been exposed to the job tasks for some time have constructed their own models of how to organize useful information about the process—whether it be by process steps, by resource (phone numbers, addresses, directories, etc.) or by institutional organization. Therefore the goal was to replicate this work process as much as possible to make information retrieval as quick as possible. In this respect the domain based on usage, and not strictly knowledge, is complex and ill-structured as well.

## Project

The project was to convert a standup training class to an interactive web site to be posted on our Intranet for access by all employees. The class objective is to familiarize all employees with the three-branch federal government processes and the associated documents that go with the steps in the government activities. The reason is that this is the basis of our corporate product and activities: we are a private publisher that gathers information on government activities and developments for our professional customers. So most of our employees need to know something about federal government processes, though each in different ways.

The reason for putting something like this on the web is the wide range of possible users, the difficulty of delivering stand up training to such a wide audience with different locations and time schedules, the "just in time" need to know data of this type for completing job tasks, and the availability of much of the source material now on-line. The project was originally conceived as Computer-based training, with tutorials and quizzes, but after further study and needs assessment, I realized that it would be more useful as an electronic performance support system and, indeed, has been extremely well-received in that respect!

The project was done in Word with its add-on Internet Assistant. This was "within budget" because Word is our office standard and Internet Assistant is free. It is an adequate software package for this project, especially since it lets you code by hand if necessary.

The product is posted on our Internal Home Page, with a direct link from the first page for ease of use. Most of the intended users have access to the Internal Home Page (i.e. hardware and software). For those that don't it is available on computers in the centralized Individual Learning Center, or a copy is available on a disk for someone to take home or use at another computer of their choice. Over the next five years, it is anticipated that all those in the intended audience will have desktop access to the Internal Home Page.

## Design

### User Interface

We originally planned a frames-based interface and a "site map" of the main sections and subsections in order to keep users in the product and provide an easy way to navigate. However, use of this is being suspended until this more advanced feature is needed (see discussion in changes section below) The program is divided into three sections: congressional (legislative), executive (regulatory) and judicial (courts.) Plus a brief, entertaining and optional introduction, fully linked index and resource guide. Colors are limited to white (background), blue (highlights and graphics) and green (optional). The choice of colors is for their meanings of tranquillity and steadiness. The navigational buttons will be plain blue. The graphics are basically black and white drawings, with some blue highlights, of three federal buildings: Capitol, White House and Supreme Court to symbolize the three branches of government. The main frame consists of a horizontal bar with 6 buttons for the intro, three branches, index and resources. Also two site maps for the two themes of the program: the sequential government process and the arrangement of corresponding documents will be added later. The six segments will be contained in six scrollable documents: each section will be in one file, rather than using a stacking card arrangement with one screen per page.

### Content Outline

**Intro:** A brief introduction of the course with link to Schoolhouse Rock video WWW site on-line: "Preamble" and "Three Ring Government." These video segments were used in the class, but the on-line site contains audio and lyrics and some video. It's entertaining, a fun "mini-case" but is separate optional button since it is not vital to everyone.

**Legislative:** Steps of the process with links to supporting documents, flow charts at each step of the way.

**Executive:** White House and Regulatory steps of the process from bill signing to implement regulations with links to supporting documents and flow charts at each step of the way.

**Judicial:** Supreme court and federal court process step-by-step with links to supporting documents and flow chart at each step of the way.

**Resources:** List of resources on line.

**Index:** Basically a map of the program in index form linked to the segments of the program so a user could go immediately to a section or document needed at a specific time.

### Improved Design

One benefit of a Web-based delivery mechanism for this course is the ability to anchor the instruction to links to current and live documents in the federal government process that are on-line. Also to link to host sites that explain themselves (such as Congress, the courts and the White House) rather than have an uninvolved third party, no matter how knowledgeable, provide the content.

But even further, Cognitive Flexibility Theory basically adds theory and design strategy to the technology driven delivery mechanism of hypertext or CBT on the Web. The theoretical elements determine best designs for the Web-based instruction.

According to the theory, flexible learning environments permit the same items of knowledge to be presented and learned in a variety of different ways and for a variety of different purposes. For my project, the material is presented as an overview from the perspective of steps in a process. At the same time, the hypertext capabilities with the Cognitive Flexibility Theory applied, creates a richly cross-linked database that delivers a series of sequential documents, discrete moments in the process, a list of resources, relationships among the processes, and deviations from the structured steps.

This is useful, because the audience really is the whole company, since everyone in the company needs to be familiar with the federal processes. However, discrete groups will use it for different purposes. Our research department answer customer questions, so they will need to be able to look up discrete events or documents. A new hire may want to study the process sequentially. A reporter may need parts of the processes depending on a given assignment at a given time. So that the navigational design must provide access from all these perspectives, and navigation along all these lines.

Thus, a concept map or site map in frames will be used eventually that shows possible navigation paths from several different viewpoints: linear overview, process content and documents. The index itself will also provide a linear overview.

In addition, more links were added to give access to documents in different ways. For instance, a link was included to a lengthy, detailed document on the judicial process for those who wanted to "study" it further. However, it turned out, others wanted immediate access to some of the more obscure courts without wading through all of the text and the entire process. So links were added where the summary on the first page mentioned them. No additional information was given on the first page, because it was still intended to be a quick overview. Another addition was direct links to a directly of courts and phone numbers for those who would use it as a job aid in doing their research. Again, it was the use of links in a variety of ways that permitted many cross paths for navigation. We needed to provide depth at the same time that we needed to provide immediate access to some details for different types of users. The use of hypertext and well-designed multi-navigational paths proved a highly effective way to do this and, at the same time keep the design simple and elegant.

Another advantage, applying this theory is linking the material to "live" documents and "live" sites—such as the White House, National Archive, House and Senate. This is not available easily in a standup training class where you would prepare handout material in advance and once it's on paper it is "dead."

The hypertext media also allows for more extensive use of case studies—in this product, that would be actual legislative or judicial histories—through multiple links, without overwhelming the user or detracting from the simplicity of the design. It also leaves the use of the cases in the control of the user.

The only place I would differ in conclusions with the theory is that the authors argue that it is best applied for "advanced" learning. Essentially, in my case, I used principles of the theory to turn a "basic" class into a dual purpose product: that is, the framework or basic interface continues to be an overview of the government processes. But robust hypertext design permits inclusion of very advanced material and job aids without detracting from the basic outline.

## Implementation and Testing

**Implementation description**. The implementation, simply, was posting it on our Internal Home Page. The Internal Home Page contains a link to "Editorial Training."

In order to make it easy to access, right under the Editorial Training heading are three links: 1. list of classes. 2. registration form, and 3. Introduction to Government Process Class. I wanted people to have immediate awareness of the product and not have to drill down to get it. While the class is also linked to the second level where it is described in the schedule, it had to be on the front page as well because it is and EPSS and not simply class materials.

Since in the time allotted for this class, we only completed the intro page and one of the three sections—Judicial Process—the other two sections were "under construction."

Promotion consisted of: Announcement to Executive Editor at a meeting, then second ranking editorial executives, then a general announcement to all employees.

At the same time, testing by users continues: this provides continuous improvement, and, at the same time, a marketing tool. For example, the legal trainer for the research department is already using the Judicial site for her training before the "ink" was barely dry on the coding to get it on the internal home page! I find that the ability to use this product "in pieces," so to speak—rather than using the whole package as you do with a stand up class—to be one of the major benefits of having this as a Web product or EPSS. Users really can take what they want and use it however it best suits their purposes.

**Testing and evaluation results.** Testing was done continuously by prospective users of the product throughout the company: research, new hires, nonlegal editorial, legal editorial, content experts, managers of prospective users, executive editor. We tested for a variety of situations and a variety of users. 1. We tested the product with the training staff for its instructional design effect and usability with completely new users. 2. We tested immediately after a stand-up training class so that we could specifically get comparative feedback. 3. We tested with managers of those who went to the stand-up training class to get feedback on its usefulness for their staff development purposes and also comparatively if they preferred the CBT to stand-up training for their purposes. 4. We tested with technical interface and instructional design staff. 5. We tested with the subject matter experts for content and design. 5. We tested with managers and staff randomly for usability and content. Testers were given a disk with the prototype, plus a paper printout on which they were instructed to make comments line by line on the elements of the product. For many, I also aurally received comments and discussed solutions to comments, recommendations, additions and deletions. They also had a brief one-page questionnaire with three questions about the overall usefulness, ease of use, and suggested changes.

They uniformly found the product useful. My favorite review said it was "awesome." Partly this is because it is the first "just'-in-time" training product or EPSS in the company and it is on a topic that nearly everyone needs to know something.

At the same time, testers gave *a lot* of really good specific suggestions for additions and changes. Some of the critical comments concerned readability—the text in a chart was not clear—and a few typos. These were all corrected. Most of the comments concerned *additions*. This indicated that people found it useful and wanted even more capabilities in the package.

**Suggested changes based upon results**. The suggested changes are too numerous to list all of them here.

A lot of the changes had to do with design issues: adding more information and detail without taking away from the simplicity; giving people the content they needed, where they needed it, without taking away from the purpose of the product which was to be an overview of the government process. This was solved by adding a few more sections, but mostly by arranging links to solve the access issues. For instance, one person wanted immediate access to information on more obscure tax and bankruptcy courts. While this was in a link to a more detailed discussion later, I added links to these specific sections in the list of courts.

Another person wanted to know about the Bill of Rights. It was a big question. While that did not strictly fit in with the structure—which is the three branch process—it seemed a big enough issue to this user that it was detract from the product. I made a content connection by adding a short paragraph, with a link to the text, and the explanation that this is the source of a lot of litigation, regulation and legislation in the three branches. My operating principle here is that since this will be a self-paced instructional piece , used without the guidance or control of an instructor, all individual questions are important, because they are precisely what will come up when a user uses the product on a solitary basis. As a result I tried to address *every* question or comment by the uses in some way.

Others found the directories and telephone numbers in one of the lengthy documents most useful, so a link will be added to the first page of the Judicial Section that will give users up-front access without changing the overall format of the first page.

There were no real suggested changes about overall format. Again, I attribute to my goal of strictly keeping it simple, and to the newness of such a product in our workplace. I suspect as people become more familiar with this product and other Web-based products, that more suggestions will come up and more changes will be made. The intent is to continually review and update the product to keep up with technology and user needs.

The frames design was not used at this stage, since it was not needed to make use of the product easy. However, I am preparing the coding for that because I feel that as the technology advances and users get used to more sophisticated designs that will be necessary. For example, for the Internal Home Page as a whole, the design is very plain, and the designers and now only beginning to design a new tables format. This product by itself is the most animated and sophisticated item on the Internal Home Page. For consistency and ease of use, the simpler design at this point was more compatible on the Internal Home Page.

## Discussion

Quality of software solution. I think the product more than met its goal of providing just in time training on government process. As mentioned, the project took on the role of an electronic performance support system. Without knowing the technical terms and concepts, using began asking for additional items to make it such. People were thrilled with the *ease of access* to the material. This was one of the goals and the response indicated it was well met. The "teacher" or subject matter expert involved is a librarian and also one of the maintainers of the Internal Home Page so that it will be easily maintained and updated.

Overall, the original stand-up training was much-needed and well-received. This product ended up going quite a bit beyond the resource provided in the stand-up training and gave people an easy desk-reference, telephone director, subject matter, content review all in one.

It can also be the beginning of building an internal "knowledge base" of frequently asked questions about the process. In other words, it is turning in a dynamic learning tool, resource and just-in-time training.

For me, it was an experience in learning the richness of the Web-format and HTML in providing a product that can answer many needs at once. Often in stand-up training have a group with diverse needs at one time really degrades the training.

Since the Web and HTML are so robust, the design can be made with links to a lot of information without corrupting the overall simplicity of the original product. It can also be made graphically attractive to use.

As for project and team work—I think the loosely constructed team of experts worked very well. Each person had experience in working on teams so there was not a long learning curve in that area. We did not have lengthy meetings. We were able to discuss a lot via interoffice email and get things done efficiently. (Having teamwork experience and enthusiasm helps a whole lot on a project like this. I am not a fan of lengthy meetings and discussions.) In addition we were able to have additional resources—frames programmer, interface designer—who were not designated team members, at our disposal easily and enthusiastically! As far as lessons learned, I would do it again that way: a small dedicated team of those who will do the bulk of the work, with easy access to call on other expert resources as needed.

## Conclusions

### Lessons Learned

**1. Keep it simple.** One of my goals , of course, was to keep the design and presentation simple. One reason was because the Internet and Intranet are very new here and people are not that sophisticated about its capabilities. But the simplicity turned out to be the magic pill. Everyone who tested the product really thought it was valuable, learned something, found it easy to use.

2. At the same time, keeping it simple yet attractive and easy to use is **very difficult and a lot of work.** I found the design and development implementation took a lot longer to do—to get

right!—than expected. Things change on the Internet, little codes don't work, the design doesn't look right in all browsers. Which leads me to another point:

**3. You must design for all browsers!** It looks different. What looks good—or a difficult execution that looks "ok" on one browser may come out entirely different on another. Again a simple design makes this easier to do, but then it's difficult to accomplish the goals in a simple design—a circular problem.

4. Above all else, **you must keep the users needs in mind first.**

**5. Test and test and test some more.** Especially since this is a product on the Intranet for ALL employees, I couldn't get away with overlooking things that might for a very focused group. The testing on different types of employees was so valuable because it gave insight into how each type would use it; what their particular information needs are, what questions popped up for each. For example, the editors were particularly aware of typos—might seem a small thing, but that's what slowed them down! One person in reading about the US Constitution asked about the Bill of Rights. While this was not directly related to one of the three branches of government, it was the first question that popped into his mind. So a added a paragraph and link, with the rationale that the rights in the Bill of Rights prompt a lot of the legislation, regulation, and litigation that churns through the three branches. It became a richer product for everyone's input.

**6. Find some way to include all of the suggested changes.** I discovered that precisely because this is an on-line product—not standup training—users won't have a trainer to ask answer questions. Therefore, any question they have while using the product will slow them down or turn them off if they are not answered. The testing process needs to be very thorough to uncover all of these questions and then the solutions must be incorporated into the product.

**7. It is an iterative process.** At this point I don't think the product will ever be completely done. That's OK. I think it is extremely important to add to it what people need to do their jobs. At the same time, design issues and goals *must* be kept in mind so that the additions and changes don't change the integrity of the product.

8. Experience with **teamwork** helps. Learning teamwork should not be a part of the project!

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## Autobiographical Sketch

**Nancee Simonson**, is a business journalist and training specialist, with a specialty in educational technology and web-based training design. She has designed and implemented editorial training curriculum and internet training for editorial, and designed a computer journalism curriculum. She is also active in the arts and arts consulting and has served as a Commissioner on the D.C. Commission on the Arts and Humanities as well as various arts organization boards. She has two children and three dogs.

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# INTRODUCTION TO GOVERNMENT PROCESS

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To use this guide: For a quick overview of the federal government process, read through the Introduction, Legislative, Executive and Judicial pages without following the linked material. To get more in-depth explanations, definitions, or additional resources, follow the underlined links.

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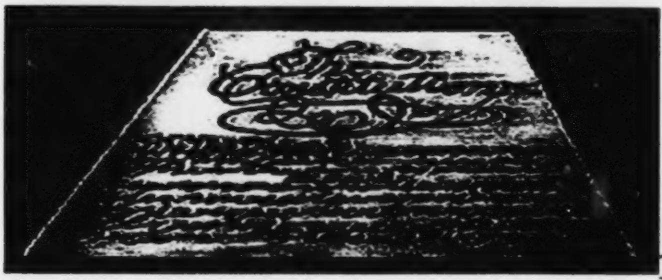
## The federal government was put into place by ratification of the Constitution

Another text of the Constitution|Background and original document at the National Archives



The Constitution *(Just for fun, this is a link to the old School House Rock video page with text and audio versions of video script)*

## The Constitution contains a system of "checks and balances" which divided the government into three equal branches. According to the text of the Constitution:

- THE LEGISLATIVE BRANCH makes laws to execute the powers of the Constitution (another site)
  *Library of Congress Legislative Branch* resources
- THE EXECUTIVE BRANCH makes regulations to carry out the laws and enforces the rules and regulations (another site)
  *Library of Congress Executive Branch* resources
- THE JUDICIAL BRANCH determines the constitutionality of bills and regulations and decides disputes about them (another site)
  *Library of Congress Judicial Branch* resources

## Although it does not relate to a specific branch of government,

**the Bill of Rights is the first 10 amendments to the Constitution. These are the source of much legislation and litigation.**

Another site for the Bill of Rights

PRESIDENT
CONGRESS

The Three Branches of Government (*School House Rock version*)

**The three branches of government are explained in more detail in the following three sections:**

LEGISLATIVE BRANCH|EXECUTIVE BRANCH|JUDICIAL BRANCH

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## Exercises

For those who would like to do some self-paced educational activities on the three branches of government, please refer to this student activities guide prepared by IBM.

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## Other Resources - General Government

Library of Congress government resources

Federal Web Locator at Villanova Universityhttp://www.law.vill.edu/Fed-Agency/fedwebloc.html

Grolier New Book of Knowledge:
Table of Contents http://www.grolier.com/presidents/nbk/nbk_toc.html
Government information http://www.grolier.com/presidents/nbk/side/usgov.html

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**INTRODUCTION|LEGISLATIVE|EXECUTIVE|JUDICIAL|EXERCISES|INTERNAL HOME PAGE**

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*Prepared by Nancee Simonson. Updated 6-4-97.*

# Partnerships That Work

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## In the Beginning

SCING is a digital, fiber optic distance learning network that began in 1993. This distance education network is the vision of a number of key leaders planning for the future of their schools. The shared vision among SCING members is to tear down the institutional walls of their organization in order to allow students the ability to have access to the best educational programming regardless of where they attend school. Those key leaders saw the significance of involving the post secondary institutions with K–12 institutions for programming purposes. The Continuing Educational Opportunities (CEO) Board was developed four years ago to study the issues of shared programming beyond traditional boundaries.

## Continuing Educational Opportunities (CEO) Board

The CEO board consists of anyone interested in providing post secondary programs over the SCING network. This board is essentially responsible for scheduling programs, writing policies and procedures, and ensuring that high quality post secondary programs are delivered to member institutions. Several things needed to occur in order to make this dream become a reality. This paper is an attempt to put those steps into a logical order so that the reader will be able to undertake any one or more of these ideas and successfully implement a partnership program.

The partners that choose to become involved with the CEO board enter into an agreement to COOPERATE! They all have a very clear understanding that we are working together as a team in order to allow programming across districts to occur. We often need to revisit the purpose for why we exist as a board, which is to provide programs to students that they would not be able to receive locally. It seems that whenever we get hung up on barriers to being successful, we revisit this goal and find a way to make the program happen! It has been a very rewarding experience to see various technical colleges, UW campuses and K-12 districts cooperate for the sake of their students!

## Priorities for Courses

SCING has set priorities for scheduling CEO courses on the network. Our list of priorities are as follows:

1. Program Credit Courses
2. Other Core Program Courses (Occupational support courses)
3. General Education Courses—Associate of Applied Science Courses (100 level)
4. Staff Development
5. Developmental Courses
6. School to Work Courses
7. Student Support Services
8. Administrative Use

9. Customized Training
10. Student discussion and study groups

There is an annual review of each course which encompasses costs, marketing, enrollment, effectiveness, quality, and administration. That review often will lead us to determine which courses should be offered again over the network and which ones should be dropped.

### FTE's

The FTE count is extremely important to the technical colleges that are members of SCING's CEO board. These technical colleges have agreed to only send courses across the network into a neighboring district if it is a course that students cannot receive from the local campus. If that is the case, and two or more technical colleges agree to share a course they will enter into an interagency agreement through the Wisconsin Technical College System Board. This will allow the institutions involved to do the following:

- Insure quality education and service for district residents
- Maximize best use of resources
- Minimize confusion to district residents
- Clarify the operations of each college as impacted by distance learning
- Foster cooperation and eliminate "raiding across district boundaries
- Participate in joint planning
- Maintain cooperative working relationships
- Insure that aidable FTE's are not lost by either district

The technical colleges have agreed that once they enter into an interagency agreement the expenses, credits, and aidable FTE's are accrued by the institution to which tuition is paid by the student, regardless of where the student claims residency. Please keep in mind that this procedure only occurs when course are shared across district boundaries.

Madison Area Technical College has developed a cooperative ITV agreement for intra district courses. They have assigned a new number for the 7th digit of the course number to identify a course as distance education. This digit will lead the data collector to a sub location in order to prorate the FTE's and associated costs. Each MATC campus involved in an ITV course offering will receive a prorated share of FTE's and also pay a prorated share of the costs for the course based on the number of students from each service area completing the initial refund periods (20th day enrollment). The prorated share includes sites located at high schools and other non-MATC locations. If students are enrolled at a site, that site is obligated to offer the course and assume its share of the costs, assuming the course has sufficient overall enrollment to run. This process is working extremely well for MATC. It allows for full cooperation between campuses and is a win-win situation for all parties involved!

### Scheduling Procedures for a Post Secondary Course

1. Approve the course to be offered over the SCING network through the appropriate Dean and/or Campus Director.
    a. Faculty assigned to teach a course using the SCING network must have Instructor's Training prior to the beginning of the course.

2. Forward a reservation form to the SCING office. The SCING office will return a confirmation to you upon successful scheduling of the course into the computer.
   a. MSTC requests are screened through Tom Liska.
   b. MATC requests are screened through Paul Meske.

3. The host site responsibility includes advertising the course as a distance learning course, listing the possible sites students can attend.

4. After receiving registration forms, call each participant inquiring which site they would be attending. MSTC has an established system that deals with location and registration, eliminating the need to call each participant.
   a. Notify SCING office of any changes.

5. The host campus will order and deliver textbooks to the nearest Technical College campus. Be sure to include a cover letter listing the course number, name, teacher name and cost of textbooks. Related course materials will be disseminated to receiving sites via mail, UPS, or CESA van deliver. All money and extra textbooks will be returned to the host campus. MATC-Truax students can call and charge books at the bookstore, and have the books shipped directly to them.

6. After the second class period, the host site will check with the teacher to find out if there are students attending at each site.
   a. Notify the SCING office of any changes.

### Conclusion

The CEO board was originally formed to develop post secondary courses for the SCING network. As the director of this network, it was my hope that we would be able to find some common ground on which all the interested post secondary institutions could partner together in order to provide more and better services to area residents. I have been amazed at what this group has accomplished over the past four years. It has been an incredible task to develop the partnerships between all the institutions that make SCING successful. I am encouraged and extremely pleased to witness the high quality programs that have evolved due to the hard work and dedication of the CEO Board!

### Autobiographical Sketch

**Joan Spillner** has served as the Director of the South Central Instructional Network Group (SCING) since its development in 1993. Prior to that experience, Joan has served as a K-12 district library media director, taught elementary school, and a technology director. She received her MS degree in Educational Administration from UW—Madison in 1988. During this past year Joan has been serving as the Chair of the Educational Technology Board and most recently, she has been elected to serve as the first chair of the Wisconsin Association of Distance Education.

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# Strengthening the Connections for Successful Collaborations Between Distance Learning Providers and External Evaluators

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A key question all distance learning program directors must address is the degree of success the institution's distance learning program achieves. Although this question can be answered with numerous means, one proven way is to include an assessment by a qualified evaluator who is external to the organization responsible for the distance learning course. This type of connection between directors and evaluators has the potential for a collaboration that results in both valid and reliable assessment data that in turn contributes to a distance course's being competitive in the expanding market. The objective of this article is to focus upon three areas of negotiation that should be addressed when collaborative efforts are selected by distance learning (dl) providers and qualified evaluators to document the programs' strengths and weaknesses.

The three areas were selected because they are mandatory for an effective and efficient assessment experience. These three steps are: (1) selecting a qualified evaluator, (2) determining the appropriate research methodology and (3) negotiating the written evaluation's form. Each of the steps are presented but one must remember that these categories are definitely not mutually exclusive nor exhaustive but rather the three categories provide an overview of items that should be considered when dl directors and evaluators connect.

## Selecting an Evaluator

Before selecting an evaluator, the dl director should itemize what is to be assessed. The dl director needs to share the same vision as the evaluator. Will the evaluation be conducted for an overall distance learning program, specific course, the learning environment, content presentation or method of delivery? Will the technological medium(s) be the focus (e.g., compressed vs. full-motion vs. satellite video) or will the people involved (e.g., teachers, students, or administrators) be the focus? The more specific the unit of analysis to be assessed, the more likely that an expert evaluator can be found. For example, a professor of education might record teaching style and students' test scores at host and remote classrooms whereas a telecommunications professor might record the interactivity within and among host and remote classrooms. Both are expert evaluators who focus upon different items for their respective investigations.

The above example highlights a resource multiple dl directors turn to for an expert evaluator. The resource is that of university professors and graduate students. The number of scholars whose research programs investigate distance teaching and learning has dramatically increased over the past decade (Jung & Spirek, 1997). Nevertheless strengths and limitations emerge when selecting university professors or graduate students for conducting independent evaluations.

Many of the advantages dl directors experience in connecting with university professors who serve as evaluators are directly linked to their positions as scholars. Oftentimes the professors are experts in the field and they are well read and published as indicated by their curriculum vita. University professors are also connected with colleagues through professional associations around the country or world and these contacts serve as an additional data base for the assessment. Limitations also become apparent when dl directors connect with university professors who complete course assessments. Time is a limitation with professors because university faculty also fulfill responsibilities that range from teaching and advising to committee work. A second limitation is that the professor might be working with graduate students on the study. Time could be lost when graduate students new to the project must be trained.

Even when dl directors select an industry as opposed to an academic professional, similar points need to be considered before making the selection of a qualified evaluator. In addition to the ones reviewed thus far, additional points are advanced.

**Points of Consideration When Selecting an Evaluator**

- Area of expertise matches that to be measured (e.g., technology or human features or both)
- Academic and or industry credentials
- Past experience with similar evaluations
- Academic or business professional
- Relationship of the evaluator's institution relative to that providing the courses
- Who owns the raw data & decision to copyright
- Budget—payment for labor, materials & equipment

### Determining the Evaluation's Research Methodology

A number of research methodology questions need to be contemplated after the dl director connects with the chosen evaluator. These are briefly reviewed before a list is provided.

The wording of the dl program assessment's guiding research questions or hypotheses should be agreed upon in conjunction with the selection of the research methodology. First however the two professionals need to determine whether the purpose of the assessment will be descriptive or explanatory and qualitative or quantitative in its orientation. "Descriptive research seeks to identify or describe events or conditions . . . (e)xplanatory research looks for underlying causes and explanation of events" (Rubin, Rubin & Piele, 1996, p. 208). "Quantitative observations provide a high level of measurement precision and statistical power, while qualitative observations provide greater depth of information about how people perceive events in the context of the actual situations in which they occur" (Frey, Botan, Friedman & Kreps, 1991, p. 99). The decisions made in response to the two questions will serve as a catalyst for determining the specific selection of the research method(s) employed (e.g., content analysis, experiment, survey). The research method selection will then require that salient components also be discussed as described in the following list. For example, populations and samples should be described before field research is conducted. Research methods that include human subjects require the ethical treatment of all participants and therefore responsibility to ensure ethical practices must be taken by one or both of the professionals. A typical situation is when the evaluator submits a proposal for review by a university's Human Subjects Review Board.

### Points of Consideration When Selecting the Research Methodology

- Descriptive or explanatory or both
- Quantitative or qualitative or both
- Research method(s) employed & justification for selection
- Wording of assessment's research questions or hypotheses
- Population description(s) and minimum sample size(s)
- Legal responsibility for ethical treatment of subjects (e.g., Human Subjects Review Board)
- Calendar schedule with final deadlines

## Negotiating the Written Evaluation's Form

The completed written formal evaluation can take many different forms and it is because of this variance that the final written assessment format should be discussed before the report is completed. Agreement as to the report's form prior to its writing can decrease the number of revisions. Specifically the dl director and the evaluator should discuss the assessment report's audience, style and form.

The study's intended audience will influence the data analyses' complexity (e.g., percentages or nonparametric multivariate analyses) and the audience will also dictate the complexity and formality of the language used in the final evaluation. The data analyses and language used in an article written for an academic journal or conference paper is different from that of a report written for practitioners or government officials. The dl director and evaluator must negotiate the presentation of the data and how the report will be written. The frequency of the assessment reports and the report's reliability and validity should also be discussed.

The assessment data's reliability and validity is a concern to the dl director and to the evaluator as well. Precautions to increase the data's reliability and validity can be taken by the evaluator by embracing a multimethodological approach (Spirek, Short & Klopfenstein, 1995) and by incorporating multiple samples (Ward & Hansen, 1993) and repeated measures (Campbell & Stanley, 1963) in the investigation's design. Precautions as to a completed assessment's reliability and validity can also be implemented by the dl director. The written report can be submitted for review by colleagues within the organization or by professionals in the field of distance learning. After the written report's validity and reliability is established, discussion as to the report's dissemination can begin.

Dissemination of the evaluation's findings must be the result of a thoughtful process. Are the results only for distribution within the organization or will the results be made public? Will these be posted on an organization intranet or perhaps the world wide web? The answer to these questions determine the audiences to whom the results will be made available. Positive and negative or mixed program evaluations will be of interest to academic and industry distance learning professionals and should be considered for presentation at professional conferences. Positive evaluations can be sent in press releases to the media to highlight the accomplishments of the organization. A positive assessment can also be used to argue for additional funding from administrators or government officials. Negative evaluations can be introduced as a component of a feedback loop that is used to improve the distance learning program but distribution of negative or poor evaluations may be restricted to "within house" or to academic conferences where a pseudonym for the institution is employed (Trachtman, Spirek, Sparks & Stohl, 1991). A variety of points are associated with the written assessment and these are provided in an itemized list below.

**Points of Consideration When Determining Evaluation Form**

- Audience for the report (e.g., government, administrators, PBS)
- Literature review of relevant studies (e.g. past & current studies)
- Research Methodology (e.g., sample, procedure, materials & equipment)
- Data Analysis and Results (e.g., complexity & quantity)
- Conclusions & Implications
- Recommendations
- Ongoing feedback reports or final report
- Respond to reliability & validity issues
- Dissemination of report

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## Autobiographical Sketches

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# Teaching Soft Skills Using Distance Education: A Comprehensive Evaluation of a BTV/OT Program

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## Introduction

Distance education is rapidly changing the nature of corporate training (Leonard, 1996; Smith, 1995; Thach & Murphy, 1995; Chute, Thompson, & Starin; Rogers, 1994; Rogers, 1994). It is generally recognized as a way to effectively train more people at lower cost. Not only do distance learners achieve at the same or higher levels than those in traditional classrooms, but it makes it possible to cut travel time and costs.

Increasing global competitiveness, rapidly changing technology, and a changing workforce are all strong forces driving the way we do business (Chute, Thompson, & Starin, 1994). Now, more than ever, businesses much be able to successfully manage change if they are to be competitive. Thus, it is no surprise that change management has become a major focus of corporate training programs. It also is no surprise that a key component of these programs is "soft skills" training, skills that are needed by business managers and leaders if they are to successfully manage change. Despite the increasing use of distance education to provide corporate training and the increasing need for training in soft skills areas, little training of this nature has been delivered via distance education and little is known about the effectiveness of distance education is providing this type of training.

## Purpose of the Evaluation

The purpose of the evaluation was to determine the feasibility and acceptability of providing interpersonal skill training for business personnel via Business Television/One Touch (BTV/OT), which is one-way video and two-way audio. The evaluation was designed to answer the following six questions:

1. How satisfied were the participants with this method of learning?
2. How well did the participants learn using this method of training?
3. How well were the participants able to apply what they learned?
4. How satisfied were the instructors with this method of training?
5. How effective was the process used in conducting the training session?
6. How cost effective is BTV/OT compared to other methods of training?

## Evaluation Approach

The broadcast was delivered to seven locations across the country in January 1997. The training consisted of a ninety-minute broadcast. The learning strategies used included lecture, discussion, and short activities. Prior to the broadcast, participants completed a short reading activity which provided background information on the soft skills topic.

Evaluation data were collected from broadcast participants, observers, instructors, and from the training coordinators at each of the seven participating locations. The data included both quantitative and qualitative data, and pre-broadcast, post-broadcast, and follow-up data were collected. The first follow-up data were collected two weeks following the training to assess learning that occurred, and the second follow-up data were collected two months following the broadcast to assess application of the learning in the workplace. The data collection methods included the use of surveys, interviews, and debriefing sessions/focus groups.

Table 1 provides information about the number of people in each group, the purpose of the data collection, the number who provided data at each data collection time, and the response rates for each.

**Table 1. Response Rate by Group and Data Collection Point**

| Groups/Data Collection Point | Purpose | Total Number | Number Responding | Response Rate |
|---|---|---|---|---|
| Participants | | | | |
| Pre-Broadcast | Knowledge pretest | 120 | 105 | 88% |
| Post-Broadcast | Attitudes toward BTV/OT | 120 | 120 | 100% |
| Follow-up 1 | Knowledge posttest | 120 | 94 | 78% |
| Follow-up 2 | Application of knowledge | 120 | 61 | 53% |
| Debriefing Focus Group | Attitudes toward BTV/OT | 20 | 20 | 100% |
| Observers | | | | |
| Observer Feedback | Attitudes toward BTV/OT | 46 | 22 | 48% |
| Debriefing Focus Group | Attitudes toward BTV/OT | 10 | 3 | 30% |
| Training Coordinators | Attitudes toward BTV/OT | 7 | 7 | 100% |
| Instructors | Attitudes toward BTV/OT | 2 | 2 | 100% |

## Summary of Results

### How Satisfied Were the Participants With This Method of Learning?

- Overall, the participants expressed high satisfaction with the broadcast. They expressed high satisfaction with the technical aspects of the broadcast, were satisfied with the instructional aspects of the broadcast, believed the instructors were effective, indicated they would participate in another BTV/OT broadcast, and believed they learned as much in the BTV/OT broadcast as they would in a traditional instructor-led program.

- As a result of participation in the broadcast, the participants were much more positive about the use of distance education and indicated that they now consider it a much more effective way to learn than they did previously. Technical difficulties detracted from the effectiveness of the broadcast for some, however, since technical difficulties was among the most frequently cited weaknesses of the broadcast by the participants.

- Interactivity was perceived as both a strength and a weakness of the broadcast. According to the participants, a strength of the broadcast was the opportunity that BTV/OT provided for interactivity. They also cited lack of interactivity as a weakness of the broadcast, indicating that while they appreciated that the broadcast allowed for interactivity, they wanted more of it.

- Although participants considered the lack of time for discussion, questions, and reflection, as a weakness of the broadcast, they were split in their opinions about the amount of time allotted for questions during the broadcast. Half thought the amount of time allotted for questions was about right, and nearly half (47%) thought there was not enough time allotted.

- Nearly seven out of ten participants (69%) thought BTV/OT was an appropriate delivery medium for the topic, while approximately one in five (21%) were unsure. Despite the uncertainty of some participants, the most frequently mentioned topics for future BTV broadcasts were in soft skill areas, with stress management, time management, and supervision training recommended most often.

- According to focus group participants, a significant advantage of delivering instruction via BTV/OT is the opportunity for people to participate in training that otherwise would not be available.

- For the most part participants felt involved in the broadcast, and indicated that they felt encouraged to become involved in the discussions and activities, felt that the instructors were speaking directly to them, and that the participants at the other locations were part of the broadcast. Observers of the broadcast appeared to have a different perception of participant involvement and cited difficulties in creating a sense of participant involvement or engagement in the broadcast as one of the drawbacks of delivering instruction via BTV/OT.

### How Well Did the Participants Learn Using This Method of Training?

- Participants' knowledge about conflict management, the broadcast topic, increased significantly ($p < .001$) as a result of participation in the BTV/OT broadcast.

- Most participants (81%) planned to apply the training and most (88%) believed that their skills increased somewhat to very much so as a result of participating in the training.

- The instructors believed that the pre-work that the participants completed prior to attending the broadcast contributed to participant learning. They also believed that lack of understanding and experience in using the equipment detracted from participant learning.

### How Well Were the Participants Able to Apply What They Learned?

- Most participants (84%) believed their knowledge about conflict management increased somewhat to very much so as a result of participating in the broadcast, and nearly two-thirds (63%) believe they increased their level of comfort in conflict situations *somewhat* to *very much so*. They also believe that their effectiveness in managing conflict in the workplace increased *somewhat* to *very much so* as a result of participating in the broadcast (80%).

- Two months following training, over 40% had applied what they learned about conflict management in the workplace. Of those who had not, most (91%) indicated they had not had an opportunity to apply what they learned. Those who had applied their knowledge about conflict management have applied what they learned with supervisors, peers, or direct reports. They have been generally successful in accomplishing their goal in managing the conflict situation, with half reporting that they achieved their desired outcome.

### How Satisfied Were the Instructors With This Method of Training?

- The instructors were satisfied with some aspects of the technology, but believe that the technology also detracted from learning. They indicated that the opportunity for interactivity provided by the technology contributed to the learning process, but considered the technical glitches as interfering with the learning process.

### How Effective Was the Process Used in Conducting the Training Session?

- The observers perceived the instructional aspects of the broadcast as effective. These included the instructors' use of the equipment, use of visuals and instructional materials, interactions with participants, as well as the instructional behaviors and characteristics they demonstrated. Overall, the observers viewed the instructors as effective.

- The three aspects of the broadcast considered strongest by the observers included the quality of instructors and instruction, the opportunity for interactivity, and the use of technology. While the opportunity for interactivity was seen as a strength, it was also considered an area where improvement is needed. In particular they believe that more time was needed for participant interaction and skill development.

- Overall, the training coordinators were satisfied with the coordination that existed between the origination site and the offices in planning and delivering the broadcast. They felt they had sufficient lead time to recruit participants, that they had adequate information about the program and their role in it, that they had adequate knowledge and instructions for serving as a downlink, and that they had the information and support they needed for dealing with equipment failures. For the most part, they agreed that they received the materials in a timely manner.

- While most of the training coordinators thought the broadcast was very effective, not all viewed it positively. Those who viewed it positively felt that the participants were engaged and that the topic was one of interest to them. Those who viewed it less favorably felt that BTV may not be an appropriate medium for delivering soft skills training and that equipment problems and participant anxiety about use of the equipment detracted from the broadcast's effectiveness.

### How Cost Effective Is BTV/OT Compared to Other Methods of Training?

- Four options for providing training were compared: (1) providing the training face-to-face at the firm's training center, (2) providing the training at each location by a trainer from the firm's training center, (3) providing the training through BTV/OT, and (4) providing the training at each location by a trainer from the location. When compared to other methods of training, BTV/OT costs the firm less than providing the training face-to-face, but more than providing the training on site by a trainer from the firm's training center or providing the training at each location by a trainer from the location.

- BTV/OT can be provided at approximately one-fifth the cost of providing the training at the firm's training center, but costs nearly twice as much as having the training center provide the training at the local sites and more than seven times as much as providing the training on site by a trainer from the site.

- Training provided through BTV/OT is the most expensive option for the *provider* of the training. Due to added technology costs for delivering instruction, the BTV/OT option results in a net loss for the provider of the training.

- The most expensive option for the *purchaser* of the training is providing the training face-to-face at the training center. Costs to the offices purchasing the training are nearly the same when the training is provided on-site by a trainer from the training center or provided through BTV/OT.

## Conclusion

The BTV/OT broadcast was considered effective by participants, observers, instructors, and training coordinators. Participants appreciated the opportunity to participate in training sessions via BTV/OT, found BTV/OT to be an effective way to learn, and as a result of the experience now view distance education more favorably.

Participants' knowledge about the topic increased significantly, their skills in managing conflict situations improved as a result of the training, and they were able to effectively apply the skills they learned in resolving conflict situations in the workplace.

Participants generally considered BTV/OT an appropriate medium for delivering soft skills training, although there were concerns. All involved liked the interactivity, but also wanted more of it.

Coordination of the BTV/OT broadcast was considered effective as was the instruction. Both these factors likely contributed to the participants' satisfaction with the broadcast.

Whether BTV is cost effective depends somewhat upon perspective. For the firm, it is more cost effective than having participants travel to the training site, but not as cost effective as providing the training at the local sites. For those providing the program, it is not cost effective due to the technology costs. For those purchasing the program, it is more cost effective than having participants travel to the training site and as cost effective as having the trainers come to the office site from the training center.

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## Autobiographical Sketches

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# A Light to the Future: Distance Learning in Iowa

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Iowa Public Television

## Introduction

In the early 1980's, Iowa educators and policy makers recognized the potential of distance learning methodologies to expand access to educational opportunities for all Iowans. By 1993 the state had begun building the infrastructure of the Iowa Communications Network (ICN). Using DS3 digital technology, this statewide fiber optic network provides full motion, two-way, interactive video, as well as voice and data capabilities to schools, colleges, universities, state and federal agencies, libraries, hospitals and national guard armories.

The fiber optic and electronic infrastructure connecting the first 103 endpoints is owned by the state of Iowa. In 1995, the Iowa General Assembly made provisions for nearly 500 additional educational endpoints. Fiber connections and electronic equipment for these additional educational sites are, for the most part, leased by the state. The distance learning interactive classroom and computer equipment necessary for connection to the Internet for other desktop uses, however, are provided by each local endpoint, and owned by that entity.

By the spring of 1997, 440 interactive classrooms were operational. By the year 2000 the total will be more than 710.

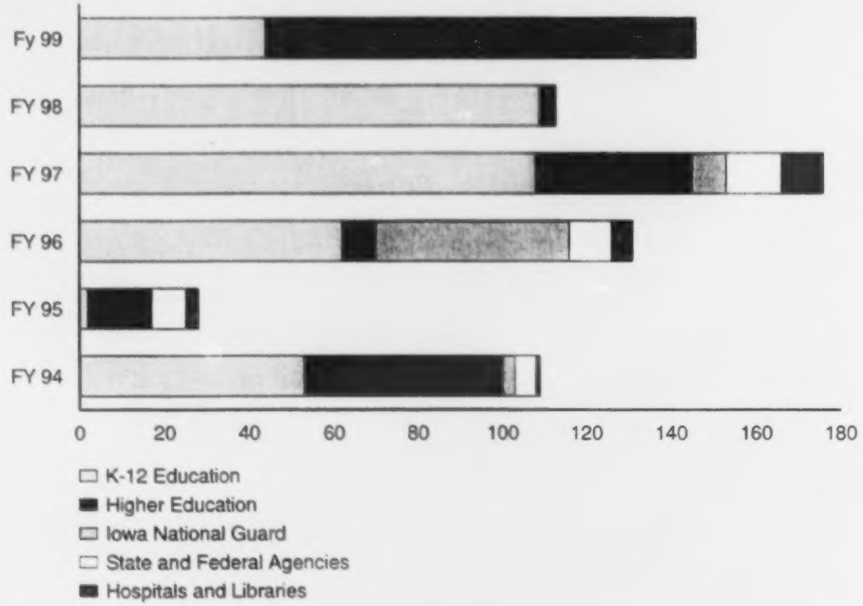

*Figure 1. ICN interactive classrooms: Build-out by fiscal year*

ICN has a tremendous potential for educational content delivery. Schools, colleges and universities are eagerly taking advantage of its capacity to offer courses, share teachers, and access experts which equalize and enhance educational opportunities statewide.

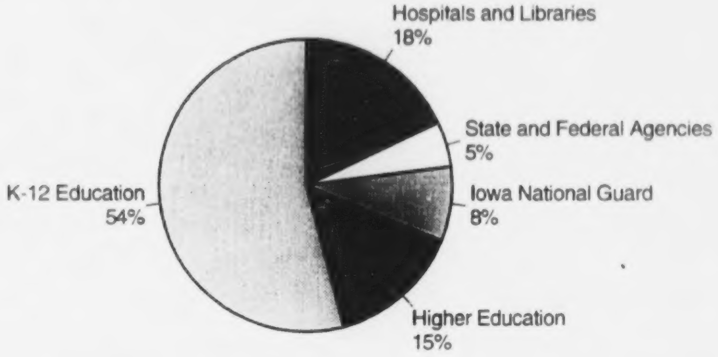

*Figure 2. ICN distribution of interactive classrooms (total by year 2000 = 710+)*

The department of Educational Telecommunications of Iowa Public Television (IPTV) plays a significant role in engineering the network, designing the classrooms, and as a focal point for its use.

### Classroom Design

Since the initial inception of the ICN, IPTV played a key role in assuring that the network design and implementation served the needs of the educational community, ensuring it would provide reliable operation with minimal technical input. IPTV also serves as liaison to school districts and advocate for equitable access to the network by all authorized educational users.

A standard distance learning classroom includes three 32" television monitors and monitor stands, a 9" preview monitor, three video cameras, a touchscreen monitor which controls the video and audio input, microphones, and an instructor podium. Many sites have added VCRs, a FAX machine, and computers to their classroom. Most classrooms can accommodate between 18 and 24 students.

Each distance learning classroom has almost identical technical design and is very user friendly. Once a room has been scheduled, a user only has to arrive at the designated time and wait for the classroom to automatically connect. The architecture of the ICN is both dynamic and flexible. Any number of sessions can be scheduled simultaneously to configure just two, or more than one hundred sites per session, tomorrow or two semesters ahead.

### Building a Strong Foundation

Technology has the power to enhance teaching and learning. It allows students to assume an engaged role in their education, transferring ownership of the learning process from teachers to students. In tomorrow's workplace, problem solving will be complex and solutions will be reached through investigation, analysis, collaboration, troubleshooting, and decision-making. In today's technology-rich classrooms, teachers facilitate student progress towards preparing for that future.

Iowans recognize the role technology plays in education, employment and quality of life. Two state initiatives, the Iowa Communications Network and the School Improvement and Technology Act, are cornerstones in Iowa's efforts to promote effective use of technology for lifelong learning. Iowa is a largely rural state, which is taking advantage of the opportunities technology brings to the educational arena. The School Improvement and Technology Act, passed by the Iowa legislature in 1996, supports district involvement in distance learning through the ICN and encourages technology innovation.

### Partnerships

IPTV has been a traditional leader in coordinating educational telecommunications in Iowa. Through close collaborations with educational partners throughout the state, IPTV ensures that its service is targeted to defined needs, and is of the highest quality. From pre-kindergarten to adult learning programs, telecourses for credit or for general interest, the learner has always had access to a wealth of appropriate content. Interactive distance learning technologies have added a dynamic new dimension to those opportunities. Very rapidly the distinction between instructional television and other distance learning technologies will become obsolete. Content will be delivered where and when it is needed.

With the digital infrastructure in place and additional interactive classrooms coming on-line almost daily, educators are actively seeking ways to use the new technology to enhance learning opportunities. While some schools have been able to fully utilize the network from the first day of their connection, others require more time to accommodate this new component into their planning process. School districts are building collaborations to share courses and teachers in a variety of ways. Grant assistance from the U.S. Department of Education has helped IPTV demonstrate the potential of the network to deliver educational opportunities, particularly to underserved communities. Some of the key accomplishments of the project so far have been to support:

- Curriculum integration of both the video and data/Internet
- The creation of an Internet web site (Iowa Database) with access to the on-line ICN scheduling program, educators "swap shop," details of every operational ICN site, and much more
- Multimedia curriculum development activities
- The Iowa's Mississippi River Heritage Project—a multidisciplinary, multimedia curricular program which will utilize several emerging technologies
- An awards program for exemplary uses of the technology in classrooms
- Pre-service teacher distance learning technology integration programs
- An Iowa 21st Century Technology Laboratory School

- Partial funding for ICN classroom equipment or data/Internet services in K–12 schools

- Demonstration and awareness activities such as live interactive field trips, and other experimental uses of the technology for K–12 education

## The Future

Beyond Iowa, connections are already being made to interactive video networks across the globe, while experiments to deliver video-on-demand and near-video-on-demand to ICN sites is nearly a reality. Iowa Public Television, in partnership with other educational entities, will continue to explore new and innovative ways of using emerging technologies to enhance the learning experience for tomorrow's citizens.

Iowa Database (http://www.iptv.org/iowa_database/)

## Autobiographical Sketches

**Wayne Bruns** is a Educational Telecommunications Coordinator with the Educational Telecommunications Division of Iowa Public Television. Mr. Bruns' responsibilities include assisting educational institutions as they plan for the installation of their distance learning classroom and in the development of new uses of Iowa's fiber optic network for the benefit of the educational community.

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**Jennifer Townsend** is contracted as Special Events Coordinator for K–12 ICN activities for Iowa Public Television, Division of Educational Telecommunications. She has spearheaded IPTV's first live interactive field trips and other pilot projects utilizing the distance learning network. She has also been an active member of the Iowa Distance Learning Association (IDLA) since in inception in 1993, of which she is president-elect. IDLA was the first state chapter of USDLA to be established.

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# Problem-Based Asynchronous Learning Resources for the Web

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Asynchronous learning resources developed as interactive courseware for the World Wide Web are receiving increasing attention because of the ease with which they can be accessed by students at the time, place and pace of their choosing. Problem-based asynchronous learning resources are especially attractive because of their emphasis on the higher-order cognitive skills that are so important for problem solving. This paper will cover the organization and use of problem-based asynchronous learning resources on the Web for an introductory course in turfgrass management at the Pennsylvania State University.

## Interactive Courseware

Many instructional resources available on the World Wide Web are actually electronic texts in that a web server is used for publishing material that might otherwise be available in hard-copy form. In the authors' opinion, interactive courseware differs from electronic texts in several important ways. First, interactive courseware relies heavily on the use of graphics. Traditional texts attempt to use words to "paint a picture" of a concept; additional words may be then used to provide supplementary information, as well as examples and applications. Interactive courseware, in contrast, attempts to convey concepts primarily through the use of graphics, including illustrations, photographs and photomicrographs. Secondly, interactive courseware concentrates primarily on concepts, as most of the detailed information may be contained in other instructional resources and references, including textbooks. Thus, interactive courseware is not intended to replace textbooks; like the traditional classroom lecture, it is intended to complement them. And thirdly, interactive courseware can be organized to be more flexible in the way it covers the material than the strictly linear format of a textbook. For example, to establish the role soil drainage plays in disease incidence in the pest management chapter of a textbook, one might make reference to the drainage discussion in the edaphology chapter. With interactive courseware, however, one could create a hyperlink to the drainage module wherever appropriate in any of the disease modules. Thus, an appropriate definition of interactive courseware might be "computer-accessible, graphic-intensive, highly flexible instructional resources used to facilitate learning."

## Instructional Modules

The heart of interactive courseware is the instructional modules. These are aggregations of instructional units composed of: (1) a graphic with which to convey a concept, process, relationship, or overview; (2) an associated text, perhaps in scrollable form depending on the amount of text required, to provide a brief explanation of the graphic; and (3) navigation icons by which to access succeeding (or preceding or looped) instructional units. A series of instructional units covering a particular topic, or a related series of topics, constitutes an instructional module.

There are several types of instructional modules, including the linear-type, with simple and complex subtypes, and the flexible-type. The linear-type module is composed of instructional units organized in a linear series. Once the student accesses the module, he or she may proceed forward through the series using the forward navigation icon (--->) to access the succeeding instructional unit. If necessary, the student can access the preceding instructional unit again by selecting the backward navigation icon (<---). At any time, the student may elect to terminate their study of the module by using the menu navigation icon. When all of the instructional units are organized in a linear series, the module is a simple linear-type; however, if some of the units are organized as loops that can be launched from one of the units in series using the loop navigation icon, the module is a complex linear-type. The flexible-type module is composed of instructional units organized in such a way that different submenus and graphic/text combinations can be brought up through point-and-click operations conducted on a single screen. These modules work well for accessing an array of information and images relating to particular issues or topics, such as specific diseases, insect pests or plant species.

The specific nature of courseware varies depending on its instructional purpose. For example, instructional modules may be used to support a conventionally taught, lecture-based course in which students may access the modules to: (1) preview the material before attending the lecture, (2) review the material after the lecture, or (3) supplant the lecture when they are unable to attend a particular class. While some students may find the modules a suitable substitute for all lectures, thus obviating the need to attend class except for exams and selected exercises, others find that the modules, used alone, lack some of the essential elements obtained from class participation. A third alternative that appears to offer considerable promise, especially for distance students, is to employ the modules as a constituent of problem-based learning resources organized as lessons and practicums on the World Wide Web.

### Lessons

Lessons can be designed with one or more instructional modules sandwiched between an introductory statement for defining the learning landscape, and an exercise in which the students' ability to apply newly acquired knowledge is tested. The first component—the introductory statement—can be supplemented with photographs hyperlinked to words or phrases in the text to enhance visualization of the material covered subsequently in the instructional modules. This statement can be concluded with a list of questions that establish the lesson's learning objectives. The second component—the instructional modules—were described earlier. Finally, the third component—a formative quiz—tests the students' recall and comprehension of the material covered in the instructional modules. The quiz is developed using a course-management software package, called Mallard™, developed by Brown and Swafford at the University of Illinois (1996, 1997). Upon completion of the quiz, a student can immediately check to determine which questions were answered correctly and which were not. Based on the outcome, the student may review the material in the instructional modules in preparation for taking the same or a similar version of the quiz again, perhaps several times. Through successive iterations of instructional-module review and quiz taking, the student can progressively develop mastery of the material covered in the lessons.

## Practicums

Practicums are problem-centered learning resources by which students develop the higher-order cognitive skills important in problem solving. A problem may be defined as an "unsettled question." If the problem is expressed in the form of a scientific puzzle, the questions to be addressed might include: What is this, what does this mean, or how does this work? If expressed as a simple technological problem, the questions might be: If this is broken, how can it be fixed, or how can this be made to work better? In a complex system, one must be concerned not only with specific components of the system, but with the array of interrelationships that exist among components; thus, with complex technological problems, the questions might be: If this were done to influence how Component A functions, what might the effects be on Components B and C? Finally, if, as in a case study, the problematic situation involves people, the important questions could include all of the above plus the following: Will he agree that this is the proper solution, or can she be convinced to allocate the resources needed to implement this plan?

Effectively dealing with problems requires a multiphase process of inquiry (Turgeon, 1993). The first phase is divergence. This involves the systematic accumulation of information for accurately describing the problematic situation. If all of the desired information is not available, one may be required to fill in the gaps with assumptions covering key aspects of the problem.

The second phase is assimilation. This involves the use of relevant knowledge of concepts, processes and relationships to properly analyze the available information and develop a thorough understanding of the problematic situation. For example, one's knowledge of the etiology of plant diseases would be very valuable in accurately diagnosing a diseased population of plants from the symptoms evident in the population.

The third phase is convergence. In this phase, the issues emerging from the analysis are identified, and various strategies for addressing the issues proposed and evaluated. Also, in this phase, decision-making occurs through the selection of a strategy for implementation. For example, in a poorly drained soil in which there are sharp textural differences in the profile that interfere with water percolation and aeration, the issue might be: unfavorable conditions for plant growth due to inadequate soil aeration associated with poor internal drainage. A strategy for addressing this issue might then be: extensive tillage and modification of the soil to blend the constituents of the different textural layers, along with some incorporated organic matter, into a uniform, adequately drained medium.

The fourth and final phase is accommodation. This involves the implementation of the selected strategy for either solving the problem or significantly improving the problematic situation. In complex problematic situations involving people, implementation of the strategy could involve several functions, including: establishing objectives, organizing the work, hiring and instructing personnel in the tasks to be performed, motivating personnel to obtain the desired performance, and tracking progress and making appropriate adjustments enroute. In other words, accommodation may involve the classical management functions of planning, organizing, staffing, leading and controlling.

## Problem-Based Learning

Problem-based learning (PBL) can be characterized as a cognitive process focusing on unsettled questions. In PBL, a particular problem type, such as a scientific puzzle, a technological problem, or a case study, is used to provide students with experience in employing the various phases of the process of inquiry described earlier. While conventional instruction typically focuses on the "lower-order" cognitive skills of recall (memorizing facts), comprehension (understanding concepts) and possibly application (applying concepts to other situations), PBL specifically focuses on the "higher-order" cognitive skills, as characterized by Bloom (1956 ). These include analysis (enriching understanding through interpretation of facts), which occurs in the assimilation phase, and synthesis (developing solutions) and evaluation (assessing alternative solutions), which occur in the convergence phase. When first confronting problematic situations, many agricultural-science students move directly from divergence to accommodation in that they attempt to immediately apply "cookbook" solutions drawn from their technological "bag of tricks" to the stated problems. In PBL exercises, therefore, they must be led through the inquiry process by the instructor to appreciate the importance of detailed analysis and careful planning to effective problem solving.

In the face-to-face (F2F) classroom environment, PBL is facilitated by a series of questions posed by the instructor. The processes of asking thought-provoking questions, listening to the students' responses, and responding to their responses, is collectively called "discussion teaching" and is thoroughly explained in a book edited by Christensen, Garvin and Sweet (1991). Distance students can be engaged in discussion classes via interactive television in much the same way as F2F students; however, the spontaneity of the discussion is dampened somewhat by the brief lag time experienced between the transmission and reception of each exchange. Where interactive-television facilities are not available, "chat" software can be used as a vehicle for synchronous discussion on networked computers. As an alternative, asynchronous exchanges can be conducted using several variations of electronic mail, including listserves and "groupware" programs (e.g., First Class, Lotus Notes), to engage students at multiple locations. With asynchronous communication, however, the lag time between exchanges can expand to several hours or days requiring a less-spontaneous, more-calculated approach to discussion teaching.

Another alternative is to incorporate questions directly into the Web-based practicums. Following the problem statement, the practicum contains a series of multiple-choice questions designed to lead students through the process of inquiry described earlier. If the student selects the "wrong" answer to a particular question, a response appears indicating that the answer is incorrect; this is followed by a brief explanation and an invitation to try again. If the "right" answer is selected, a response appears indicating that the answer is correct; this is followed by a confirming explanation, as well as explanations of why the wrong answers were incorrect, and an invitation to proceed to the next question.

## Conclusions

Computer-based interactive courseware can be developed to enable students to acquire the entire range of cognitive skills contained in Bloom's taxonomy. Graphic-intensive instructional modules sandwiched between an introductory statement and a formative quiz are used to constitute lessons designed to convey recall knowledge and comprehension. Practicums composed of problem statements and a series of questions for leading students through a disciplined process of inquiry are designed to enable students to acquire higher-order cognitive skills, including: application, analysis, synthesis and evaluation.

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### Autobiographical Sketches

**A. J. Turgeon** is professor of agronomy at The Pennsylvania State University. He developed and teaches case-studies courses in turfgrass management and conducts research in turfgrass morphogenesis, edaphology and management systems. He is the author over 200 publications, including a widely used textbook entitled "Turfgrass Management," now in its fourth edition. In addition to his academic responsibilities, he currently serves in an administrative appointment as director of educational technologies in agricultural sciences.

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# Transforming a Traditional Distance Education Organization: Athabasca University Faces the Challenge

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## Background

Athabasca University is an open access, distance learning institution with approximately 12,000 students in more than 22,000 course registrations. AU offers eleven undergraduate degrees, eleven university certificates and four graduate programs. There are currently more than four hundred courses available at the undergraduate level.

Athabasca's course delivery model is based on continuous enrolment (starting any course at the beginning of any month), with primarily print-based course packages designed for individualized study supported by both telephone and computer-mediated tutorial support.

Athabasca University is located in a small town in north central Alberta, most of the tutors are spread across the province, and the students come from every province and territory in Canada and, increasingly, from outside the country. The majority of the students are between the ages of 25 and 45 and two-thirds of them are female. One-third of the students have high school or less and another third are university graduates. Three-quarters of the students are currently employed and forty percent of these are receiving some kind of assistance from their employers to pursue their AU studies.

Since AU is a single-mode, distance learning institution, with no campus-based classroom infrastructure, all of its systems focus on supporting the adult distance education student. The University's mission statement declares that AU is "dedicated to the removal of barriers that traditionally restrict access to and success in university-level studies and to increasing equality of educational opportunity." This student-centred approach to distance learning is reflected in the manner in which the University's systems are developed.

## Issues

Over the last few years, Athabasca University has been dealing with the major issues of reduced funding resulting in the need for structural reorganization, the increase in competition for distance education students both nationally and internationally, and the rapidity of technological change.

### Funding Cuts and Reorganization

In 1994, AU's budget (based on provincial government grants) was cut by twenty-six percent over three years. A wise decision taken at this time, was to deal with the cut in one year rather than prolonging it. AU lost twenty-two percent of its staffing at this time, primarily through buyouts. Since this results in serendipitous rather than planned reductions in specific areas, it then required a major revisiting of the organizational structure.

One of the major organizational changes was the formation of the Educational Technology Department. This gathered together in one department the editors, visual designers, the Web-master, multi-media specialist, instructional design expertise, documentation and training specialist, and systems analysts all of whom are devoted to the production of course materials. This restructuring brought together those who were involved in the previously primarily print-based production, with their years of experience in the process, with those who will be introducing the new technologies and techniques into course development, production and delivery. This restructuring has proven advantageous and has resulted in greatly increased creative synergy and streamlined production processes.

### Competition and Collaboration

Competition for distance education students has increased dramatically over the past few years as many traditional classroom-based institutions enter the distance learning field. AU's main approach to this increased competition has been to continue producing the highest possible quality materials and providing the best possible service to students.

In addition, Athabasca University has entered into collaborative agreements with numerous college level institutions to provide capstone degrees and post-diploma degrees and certificates. This is mutually beneficial since AU gets more student registrations and graduates while the traditional institutions do not have to expand either their course offerings or physical plant while offering increased services to their students allowing them to continue their education within their home communities.

Another way in which AU is dealing with the competition is to increase access to its courses through the integration of technology into its delivery, particularly through the use of the Web. AU has been developing a strong Web-based presence in both its administrative and instructional systems (see homepage at http://www.athabascau.ca). All AU students are entitled to a computer account and all university departments are accessible electronically. Tutor support can now be provided either through telephone or via computer-mediated communication as is convenient to the particular student's needs and capabilities. Students can now register either traditionally or via the Web and can access all university services in both modes.

In terms of course delivery, AU always attempts to increase rather than inhibit access. For this reason only limited programs are offered in single-mode electronic delivery which requires students to have high level computer systems. Outside these programs, courses are developed for dual-mode delivery and are designed so that they can be delivered in either print or electronic format.

AU has always had a well-defined system of course planning and development. The formation of the Educational Technology Department has facilitated the introduction of advanced technologies into the system. Editorial, visual design and instructional design resources are all applied to courses in development for any and all modes in which they will be delivered. Academics wanting to incorporate new technologies into their courses have a central point of contact for expertise. Issues of student support and faculty training can be addressed early in the process of course development and integrated into the delivery design.

## Conclusions

Almost all distance education institutions are facing the challenge of increased competition and technological change and many are facing reductions in funding. At Athabasca University, these have been handled systematically through organizational change, redefinition of processes, continuing emphasis on quality of product, and a student-centred approach to accessibility to, and flexibility in, the learning environment.

## Autobiographical Sketch

**Judith van Duren** has a BA in Computing and an Msc in Adult Education. She has worked at Athabasca University since 1986 in the areas of Academic Computing and Educational Technology. Her current work includes the coordination of the University's course materials production, and the development of new production processes as required by the changing technologies.

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# Rules of Thumb for Designing Interactive WWW Based Learning Modules: Lessons From Continuing Medical Education

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## Why Is Continuing Medical Education Needed?

The modern explosion of scientific and medical knowledge places a heavy responsibility on physicians, nurses, and other medical professionals. The rapidly increasing body of information and the changing health care environment require that health care professionals devote considerable time and effort to maintaining current competencies and gaining new knowledge and skills. Yet, the traditional didactic lecture and discussion model is no longer adequate in meeting the learning needs of health care professionals.

Traditionally, consultations with colleagues, independent reading, and formal continuing medical education (CME) are the primary avenues for medical professionals to learn and solve patient care problems. Most states (38 of 50) require a specific number of credit hours, usually 20–30 per year, for medical professionals to renew their professional license to practice. The few states that have no CME credit requirement for licensure tend to have substantial remote areas where access to continuing education conferences is extremely limited. They already have a serious physician shortage and are unwilling to establish an additional obstacle to recruiting and retaining medical professionals.

Conversely, physicians practicing in urban environments or near academic medical centers are bombarded with invitations to attend conferences, symposia, workshops, lectures, grand rounds activities and other CME events. A recent survey at the University of Florida Health Science Center revealed that a continuing medical education conference or lecture is occurring constantly between the hours of 7:00 AM and 6:00 PM from Monday through Friday. Clinicians also receive large numbers of medical journals, books, newsletters, clinic alerts, medical briefings, CD-ROMs, video and audio tapes providing information promoted as *vital* to patient care. An illustrative anecdote contributed by a medical librarian described a simple comparison of a professionals time and available printed information. In tabulating the number of medical journals currently available, the librarian calculated that if a medical professional could read one entire journal a day, at the end of the year he/she would be 10 years behind in his/her reading. Yet, factors such as managed care, reductions in Medicare funding, and other reimbursement levels require a greater volume of patient care and allow less time for professional development and skills maintenance. In addition, primary care professionals are being required to treat a wide range of diseases and medical problems without the assistance of specialists. In Florida, one of the leading HMOs recently dropped several physicians from inclusion in their coverage as a result of a pattern of above-average referrals to specialists.

Litigation surrounding patient care also causes an increase in the importance of CME. Risk Management attorneys and managers counsel clinicians that, "Every patient that you see in the examination room or operating room you may see again in a courtroom." The Standard of Care is central to the determination of malpractice. Yet, the current CME model does not provide a means for health care professionals to remain current on a constantly changing standard of care for thousands of medical problems.

### CME and the WWW

The World Wide Web offers an information and educational delivery system that shows great potential for providing direct and immediate access to up to date medical information and CME. Currently, only a relatively small number of CME activities or learning modules are available on the WWW, but the number is increasing daily. Also, the majority of practicing physicians and other professionals are not connected to the Internet, nor do they look to the WWW for medical education opportunities. However, this situation is rapidly changing. Medical education professionals are finding the WWW to provide an excellent delivery system for CME that can be directly relevant, interesting, and interactive, and available at any time and anywhere.

Unfortunately many educators producing CME on the WWW are attempting to do so by simply converting the traditional lecture or written material to an electronic form. Some learning modules are characterized by dense text with some pictures and charts, and a few links to other resources. These have not been well received and are viewed as even less convenient than the printed material. The recent development of audio and video streaming has allowed the creation of other modules featuring the speaker's voice and face or slides. These modules are an improvement over the text-based versions, but fail to take advantage of the interactive capability of the WWW. They tend to be a variation of the well-know videotaped lecture format but with lower quality audio and video fidelity.

### Recommendations for the Design of CME Modules for the WWW

Medical education professionals at the University of Florida have tried to develop CME modules for the past three years. We learned a lot through our mistakes and feedback from our audience. We have identified the following "Rules of Thumb" that guide us and our collaborators in our quest to develop a repertoire of high quality modules.

- Physicians and other medical professionals are a tough audience. Their time tends to be limited and precious. As a group they are intolerant of glitches and problems and reach a frustration level with technology very quickly. Thoroughly test modules prior to release; a single negative experience often results in complete abandonment.

- Graphics and pictures are vital, yet many physicians are connected through their home modem and loading times can be very long. They are not very tolerant of waiting for graphics to load.
    - Recreate text slides or charts as smaller images into Web pages, instead of providing them as separate JPEG files.

- Even though as a group they are high income, physicians tend to be unwilling to pay for CME. Many are reluctant to use credit cards on the WWW to pay for activities.

  - The going rate for a 1.0 credit hour of CME is $15.00–$30.00

- Avoid letting the technology exceed the capacity of the user's ability to receive and view it.
  - Sophisticated plug-ins like Shockwave and Quick Time often cause difficulties that physicians are unable or unwilling to work through.

- Educational activities should be problem based. "Problem-Based Learning" (PBL) is more engaging and interesting to clinicians. Also, PBL promotes retention, storage, and transfer of information.
  - Case presentation are an excellent way to engage the learner, pose a problem and ask for a solution.

- Educational activities should be interactive. It is vital to move beyond the "passive learning" module to learning activities in which the learner plays an active role in his/her learning.
  - Self-assessment questions can be used through the activity to involve the learner and reinforce important concepts. They also provide a means for branched instructional design.
  - Real Audio/Video offers a tempting technology to provide lectures available to large audience via the WWW. It is only slightly better than videotaped lectures, which are not well-received.

- Offer a multi-level educational module. One level for the practitioner who wants a few "pearls" to use right away and another level for professionals who are interested in a more in-depth experience of the research and science of the topic.

- Develop and include patient information pages that can be printed or downloaded for distribution to patients.

## Summary

Distance continuing education is conveniently offered in distinctly segmented learning modules. Designers often make the mistake of creating modules that are composed of dense text with a few graphics and "clickable links." These modules fail to take advantage of the unique interactive nature of the WWW and are tedious and difficult to follow. The case-based approach to learning and "Problem-Based Learning" have been demonstrated to increase learner interest and engagement, and lead to greater retention and transfer of knowledge gained. The WWW provides an ideal environment for instructional modules that are interactive and problem-based or case-based in nature.

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# Interactive Connections in the Classroom From the Students' Point of View: What Happens, What Helps

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> *When I first walked into the Com-Net classrooms, I was surprised. I judged that these learners were disrespectful. They did not appear to be paying attention to the instructor, they talked among themselves, they left the room during class, and they sat wherever and however they wanted. I realized that in order to appear to fit in and be accepted as a fellow student, I would have to loosen up and imitate their behavior. Then, just as I forced myself to spread my stuff around me, put my feet up, and join them, I understood that no one was there to see that we sat up straight and spit out our gum. We were adults! We were free to act like adult learners.*
>
> —Walden, 1997

## The Research Study

Research about adult learners at a distance has focused primarily on the learners' motivations, persistence, and satisfaction. Standard procedures for studying adult learners at a distance have been surveys and interviews. Consequently, the gathered data have generally been the result of self-reports which have been interpreted from an outsider's perspective. Instructional strategies have been based solely on those results. The findings of many of studies show that the learner attributes being studied are related to the learners' perceived and actual opportunity for interaction.

A field study was conducted to investigate distance education from the "other side," or the students' perspectives. The research questions were, "what interactions do learners at a distance exhibit that influence their learning, what events prompt and end such behavior, and what observable outcomes result?" The data gathering was done at four remote sites by auditing 11 complete courses being delivered via audio-graphic teleconferencing for university credit. The researcher then facilitated separate focus groups with instructors, technical assistants, and learners at three additional receive sites in order to check findings and interpretations with learner understandings of what was taking place. Another focus group for site administrators was lead by an outside facilitator.

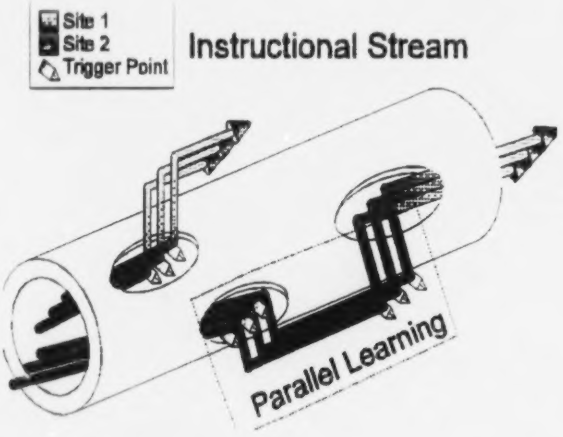
The researcher participated as a student in all classroom events such as exams, discussions, group work, and extra curricular conversations. Outside reading was done as necessary to be able to participate in discussions and to perform at least acceptably well on in-class exams. The researcher took field notes as completely as possible, and as it was usually natural in the course of a class session, an audio tape was recorded.

## The Findings

The learners' behaviors could be entirely described by the following types of interaction: learner with instructor, learner with learner, learner with content, learner with interface, and learner with environment. All but the last category have been proposed in the literature (Moore, 1989; Hillman, Willis, & Gunawardena, 1994). This study provided empirical data which confirmed and expanded on the former categories plus led to the formation of the "learner with environment" category. Table 1 in the workshop summary titled *Designing Instruction Based on Naturally Occurring Interaction* in these proceedings summarizes the findings about each of the interaction types.

### Parallel Learning

Learners in the distant classrooms are free to obtain part of the content independently of the instructor. Burnham (1995) described the term parallel learning as the acquisition of the course content that takes place concurrently with but independently of, the delivery of instruction. We use a diagram to represent this phenomena. While the instructional stream is moving along, some of the learners check out but continue to learn the content. At some point, most of the learners return to the instructional stream.



The research study documented the existence of four types of parallel learning. The four types were identified by whether the instructor was talking about the content of the course itself or the process of obtaining the content such as assignments and exams, and whether the students were also concurrently discussing the course content or the process independently of the instructor. Thus, the researcher observed four possible types of parallel learning based on the topics of discussion. Those four types and their acronyms were instructor-content/student-content (c==c), instructor-content/student-process (c==p), instructor-process/student-content (p==c), or instructor-process/student-process (p==p).

Parallel learning comprised specific subsets of learner interactions. For example,, anytime there was c==c or p==c there was learner-content interaction by definition. The most frequent form of parallel learning was c==c. That is, the instructor delivered content and at the same time the learners discussed or read the content of the course independently of the instructor. The second most frequent, though about half as often as the c==c, was the c==p. In this form, for example, the instructor delivered the content, and at the same time the learners discussed the assignments, or perhaps asked the technical assistant about homework or exams. The least common was p==c. When the instructor talked about procedures related to the acquisition of the content, the learners usually paid attention to the instructor. Rarely did learners continue a discussion of the content. Table 1 shows the percentages of each type of parallel learning that were counted in the field notes.

**Table 1. Percentages of Each of the Forms of Parallel Learning Behaviors Counted in the Field Notes**

| | Instructor Activity | |
|---|---|---|
| Student Activity | Instructor Content | Instructor Process |
| Student Content | 57% | 3% |
| Student Process | 33% | 7% |

Based on the observations there were at least three reasons why parallel learning took place. First, it was easier to communicate with someone in the same room. Second, it was uncomfortable to interrupt the instructor because a raised hand was not visible to the instructor. Third, there was a camaraderie among the students at each of the sites. Parallel learning took advantage of the ability to learn together in contrast with learning individually.

### Peer Groups

In 9 of 11 of the courses at a distance, distinct peer groups formed. Two of the courses had two peer groups. These were groups of learners who were regularly interacted with each other. They were regular in the form of their interactions and in the their choice of other learners with who they interacted. The groups formed to work together on the content, socialize, or in two cases, both. The interactions within the group were generally ongoing throughout the class periods and throughout the course. Table 2 shows the information about the peer groups in the courses.

They formed because of the need for mutual assistance or previous acquaintance. Some of some of the learners were not acquainted before the course began, but identified each other as someone who could help them understand the material. They did this by discussing the concepts during the lecture, providing additional examples from their own lives, or working problems together. Acquaintances either had experience working together or socializing together and so they began the course as a pair that later included other learners.

All eleven of the peer groups began with two learners. Many of the pairs eventually admitted all or some of the other learners into their groups, but a few did not. In each of the two courses that had two groups, one pair expanded and one did not. In two of the other courses, groups that did not grow beyond the pair had only two learners in the classroom and could not grow. If there were only two learners they did not automatically form a group. There was one course with only two students and very little learner-learner interaction during the class periods and so a pair did not form.

In the distance education classrooms where the learners are adults, they frequently learn together. In a face-to-face classroom, the instructor has more control over the interactions that take place. Learners tend to look to the instructor for interaction about the content rather than each other. In the distance classrooms the instructor can only hope to influence the interactions and encourage the beneficial and discourage the detrimental interactions.

**Table 2. Student Peer Groups and Their Demographics**

| Course | Number of students in course | Inclusions in pair | Focus of group | Source of beginning | Inclusion of other students |
|---|---|---|---|---|---|
| Agriculture education | 3 | Pair with inclusion | Content & socialize | Acquaintance | Total |
| Art | 2 | None | None | None | None |
| Business | 2 | Pair only | Content | Need | Total |
| Elementary education | 2 | Pair only | Content | Need | Total |
| English | 9 | Pair with inclusion | Socialize | Acquaintance | Partial |
| History | 3 | Pair with inclusion | Content & socialize | Need | Total |
| Human environment | 3 | Pair with inclusion | Content | Acquaintance | Total |
| Math | 8 | Pair only | Content | Need | None |
| Psychology | 11 | Pair with inclusion &<br>Pair only | Attitude<br>Content | Acquaintance<br>Need | Partial<br>None |
| Science | 10 | Pair with inclusion &<br>Pair only | Content<br>Content | Acquaintance<br>Need | Partial<br>None |
| Sociology | 6 | None | None | None | None |

## Possible Instructional Strategies for Using What Comes Naturally

Instructors in the classroom see the behaviors and signals of their students. Most often, at a distance, instructors are not aware of the minute by minute cues that their students display. Knowing what happens in the classrooms at a distance and being aware of typical behaviors can help instructors predict how their instruction is being received. Knowledge about the learners' interactions can assist the instructor in planning instructional strategies that make use of what interactions occur naturally. Learners in these classrooms naturally learn with each other. Because parallel learning is a special subset of the five types of interaction and peer groups form naturally as groups interacting with each other, we offer a summary of some methods for encouraging each of the types. Those recommendations can be found in Table 2 in the workshop summary titled *Designing Instruction Based on Naturally Occurring Interaction* in these proceedings.

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# The Contribution of Electronic Libraries to Distance Education and the Contribution of Distance Education to Electronic Libraries

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## Abstract

Since the Arizona State University East campus is located 25 miles from the main campus, many of the students enrolled in east campus programs have relocated to the available housing in the area, and are dependent on means other than going to the library to receive assistance with in depth research and basic reference. With no print resources, the library staff was faced with the challenge of providing access to resources by the use of non-traditional means. It has always been the role of librarians to "evaluate and broker information sources offered by private vendors and, especially, to educate researchers in their use." (Bazillion & Braun, 1995, p. 51) Filling that role in an electronic environment is both easier and more difficult than it is using traditional print resources. In the course of our reading about distance learning, one of the more striking observations we made was that interactive (live, real time) contact with the instructor (reference librarian) was not necessary to achieve the goal. (Kinnaman, 1995, p. 58) Utilizing these ideas and some others borrowed from distance education practitioners, we have been meeting the challenges with a combination of technologies and procedures that we continue to refine.

## Background

The title of this paper is "The Contribution of Electronic Libraries to Distance Education and the Contribution of Distance Education to Electronic Libraries." I named it that way for a particular reason; since this is a conference about distance learning, I thought that it would be more appropriate to discuss achieving educational goals through the use of electronic library resources than it would be to focus on the creation of a successful electronic library through the use of distance learning technologies and practices, even though in practice, that is *my* goal. First, let me give you some background information on ASU East and on my personal interest in distance learning.

### ASU East

ASU East is a new branch campus of Arizona State University which is located on the former Williams Air Force Base. When the federal government announced the first list of military bases which would be closed, and one of Arizona's bases was on the list, many people anticipated that the closure would create an unrecoverable hardship on the economies of the cities in the southeast valley of the Phoenix metropolitan area. Lattie Coor, Arizona State University's President, had been looking for a suitable location for a branch campus to extend the capacity of the existing two campuses to meet increased demand. He realized the potential of the soon to be vacated Air Force base with its existing infrastructure which included an airstrip, housing, classroom and office buildings, a gymnasium, swimming pools, track and numerous other useful structures. With that in mind, he met with some other area educators who were also interested in utilizing the facilities of the Williams Air Force Base when it was closed, forming an entity informally called the "East Valley Think Tank." As a result of exceptionally strong interest on the part of this group and on the leadership exhibited by individual members of that group, intergovernmental agreements were formed between ASU, Maricopa County Community College District, the Gila River Indian Community, the city of Mesa, Embry-Riddle University and other organizations to develop and operate an educational community which would offer a Research I University education in a small-town college atmosphere.

ASU relocated two schools to the new campus; the School of Agribusiness and the College of Technology and Applied Sciences. Those two academic departments, while not being overlooked on the main campus, were being stifled by lack of space and opportunity to grow. The inaugural semester enrollment was 1018, more than anyone had predicted and the first term started in August 1996.

### Personal

I graduated from the University of Wyoming in 1977 with a BA in Spanish. I held several jobs in the book business with bookstores and wholesalers before moving to Arizona in 1984. I started work in the library at ASU in 1985 and in 1990, I was accepted into the MLS program. There was only one catch; the Arizona university with the accredited library school was not ASU, but the University of Arizona in Tucson, 110 miles to the south. I needed to continue working full time for financial reasons including the tuition waiver I received as a university employee, and my family exhibited no interest in relocating, so I had to figure out a way to make it work. U of A offered one or two extended education classes taught by adjunct faculty in the Phoenix area each semester, so I started by taking as many of those as I could take. I needed to complete 12 semester hours on campus in Tucson, however, so when I was faced with that I looked for a class each semester which was taught in a once a week late afternoon time slot to make it possible for me to drive to Tucson and back in one day without missing much work. There were usually several other part time students from the Phoenix area who were taking those classes so car pooling was popular. The car pooling experience convinced me that students learn much more from each other in small group interactions than they do in the classroom, an observation that was corroborated by published research. (Ehrmann, 1995, p. 1) U of A also offered a class once or twice a year called a "pre-session" class which was scheduled during the break between fall and spring terms, or between spring and summer terms. This was an intense three week long, daily class which met for three or four hours. I met a number of now-librarians from all over the western US in the pre-session class that I took, many of whom share my sympathy for distance learners. I graduated from the U of A in 1993.

### First Year Experiences on Williams Campus

The nature of the programs taught and the research conducted in the two schools makes the delivery of library services in a totally electronic environment easier than it would be if the relocated programs were in the humanities or fine arts. My initial (foolish) assumption was that the faculty in the College of Technology would be familiar with and comfortable in the electronic library environment while the Agribusiness faculty would need extra help and encouragement to be that complacent. The opposite proved to be true which was illustrative of the kinds of mental adjustments I needed to make.

There were no print library resources relocated, although an acquisitions budget for the library was established for the future purchase of any materials needed. One of the goals that the library staff had was to substitute service for printed resources. In striving to provide that level of service, we began exploring the distance education literature for ideas. Gradually, we came to the realization that while distance education practices have an important role in the service libraries offer, library services, electronic and otherwise have an equally important role in distance education, a position which was echoed in the literature. (Faulhaber, 1996, p. 854)

Among our successes was the document delivery service (we use that term for photocopies and books delivered from ASU holdings as well as for interlibrary loan from other libraries) that we provide to Williams campus affiliates free of charge. Our goal was to achieve turnaround time of 24 hours from the time that the user submits the request until he or she has the requested material in hand. We have not accomplished that. Our current turnaround time is 81 hours for all types of requests. We have learned a great deal about document delivery this year, and one of the things that we have learned is that the average library user on our campus picks up his material 3 days after being notified that it is available for pick up. We don't interpret this to mean that achieving faster turnaround time is not a worthwhile goal, but that there are some factors in that attempt that we have yet to overcome. We also learned that we had to request book loans from other libraries far more often than we had thought we would. The interlibrary loan process for a book takes about 2 weeks on average. It doesn't take too many of those to slow down an otherwise rapid turnaround time.

We set up a listserv titled Eastl which the library staff co-owns and we added all the faculty and staff on campus to the distribution list. Its initial purpose was for announcing new services and acquisitions, publishing changes in our hours of operation, alerting the campus community to revisions in the library catalog and other library related news. From the beginning, however, campus administrators took advantage of that already established communication tool to have us post other kinds of announcements. This practice increased the library's visibility on campus which proved to be advantageous to us in some subtle ways and we have capitalized on those. The programs on our campus are not library oriented. Their research is field or laboratory research and the faculty are not accustomed to thinking first of the library as a source of information. The mere fact that many of the announcements that they get regarding campus events come to them in their e-mail with a library staff signature reminds them that the library *is* an information source. They, in turn, remind their students.

The most successful "acquisition" that we made during the year was a subscription to *Dow Jones News Retrieval Service*. The online service came with three passwords and unlimited searching. It includes stock and commodity market information, SEC filings for publicly traded companies, and the full text of about 3000 periodicals including major national newspapers, business and marketing journals, aviation and other industry related publications and popular magazines. We loaded the client software on the seven public terminals in the library and supplied one of the passwords for those terminals. We published the URL address of the site where the client software can be downloaded and the second password on the Eastl listserv for faculty members to use from their home or office computers, and we kept one of the passwords for citation verification and document delivery. At a cost of about $7000 a year, it has more than paid for itself. We couldn't possibly subscribe to 3000 periodicals for $7000 a year, and that figure would not include indirect costs such as staff time or space for processing and shelving printed collections.

We have looked for web page links which are useful to our curriculum and community and put those on our page. Partly because there are so many and because I have spent a large part of my first year actively looking for them, our web page has become more difficult to use than I would like. The only one of us on the library staff who is able to answer with any certainty where we put a particular link is the one who actually does the HTML. We are currently looking at software packages which would help us index or catalog our web page and make it easier to find links. One of the projects that we will undertake this summer is re-designing our pages, putting email links in where appropriate, so users can send a query to the email account that we have set up to handle remote reference. The reference model that we seek to utilize is less one of providing ready reference than one of providing consultation.

We are also developing class aids pages, in cooperation with individual faculty members who have provided syllabi for the classes that each of them teaches. We plan to spend time linking resources chosen specifically for each class assignment to the class aids page for each class. We are planning to add a digital text server in the fall term which will enable us to offer electronic reserves as part of the class aids project. Many of the resources used in the agribusiness and in the aviation classes are US Documents. Since so many of those are online, either in PDF format or as downloadable spreadsheet files or text files, links to them are, in effect, digital reserves. Another tool that we are looking into is the use of computer conferencing software so that the distant learner can see what the librarian is doing at the time it is happening, and the librarian can see what the researcher is doing that may be causing the difficulty in locating the appropriate link. We are using a software package developed by Research Libraries Group specifically for document delivery which enables a scanned document to be ftp'd to the patron's email account as an image file, provided the patron has an email account on a POP3 MIME compliant server. The files may be viewed in any multi-image TIFF viewer. (This sounds fine in theory, but we have not succeeded in sending a file to any of our patrons yet.) When this is successful, we will be able to overcome the three day delay from notification to pick up, at least for articles.

Despite not having been able to advance as far as we would have liked to the first year, our use statistics, both in-library and web visits, increased dramatically from the fall term to the spring term. In-library use has increased 10% from fall term to spring, and, more significantly, web visits from within ASU's domain but outside the library have increased by *80%* during the same time period.

In conclusion, we have learned a great deal this last year, and we feel fortunate that some of our early planning, when we really had very little idea what to do to make things work the way that we wanted them to, was as propitious as it turned out to be.

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### Autobiographical Sketch

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# Distance Teaming:
# A Distributed Undergraduate Program in Computer Engineering

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## Introduction

As the national economies of the world become more tightly linked, and globalization of industry continues, the nature of the industrial workplace is changing dramatically. Today, it is not uncommon for a manufacturer to form a number of alliances with other manufacturers throughout the world during the design, development, and production stages of new products.

This worldwide collaboration has had significant impact upon the organizational structure of engineering design and development teams. It is not uncommon today for a design team member based at a given location to be collaborating with other members of the same design team in a number of other widely scattered geographic locations. In particular, a modern design team in the Electrical and Computer Engineering field could easily be scattered among several locations in the United States, Europe, the Middle East, and the Far East. Probably the best known example of this distribution of workflow within a project is the recently-completed Boeing 777 commercial aircraft; designed and engineered concurrently in a number of countries throughout the world.

Industrial professionals are expected to be able to contribute productively in this environment of distance collaboration, and yet there is essentially no training at the university level that gives exposure to this type of distributed workgroup configuration. Typical engineering degree programs today involve students in a single laboratory or classroom with instructors and other students immediately available. Remote access is, typically at most, limited to use of the web or email to the instructor for student questions. Distance education is available and being used, but it is rare for the students at the remote sites to have more than a passive relationship with the rest of the class and the instructor.

The ramifications of this lack of training are significant. When attempting to collaborate with other engineers in remote locations, communications abilities become paramount. Above and beyond the ability to engage in effective communications, however, the engineer needs to have a firm understanding in the strengths, weaknesses, and uses of contemporary telecommunications technology, and to be comfortable with its use.

This paper focuses upon the effort to construct and bring on line a degree program in Computer Engineering that has a structural component exposing student engineers to the concept of distance teaming, and training them in not only the art and science of Computer Engineering, but also distance teaming.

## Distributed Computer Engineering Program

Embry-Riddle Aeronautical University (ERAU) is a multi-campus University, with two residential campuses in Daytona Beach Florida and Prescott Arizona, and over one hundred Extended Campuses scattered throughout the world. Being a multi-campus University with substantial DL activity, ERAU is familiar with the concepts and practices of distance education, and the advantages and problems associated with it.

ERAU has recently inaugurated a new degree program in Computer Engineering, which models the industrial environment that the students will enter upon graduation. Not only will the students be deeply involved in team engineering projects, but the entire structure of the new program is to be bilocated between Daytona Beach and Prescott. This distributed nature of the program means that the faculty, staff, and students associated with the Computer Engineering program will be physically located at opposite ends of the United States, and all instruction will be done via distance education technology.

The goal of this effort is to construct an innovative, effective, and adaptable curriculum for the Computer Engineering program that will prepare students for the globalized nature of the workplace they will find themselves in upon graduation. While much of the coursework is similar to the existing Electrical Engineering and Computer Science programs, the demands of distance teaming has required much paradigm shift, training of faculty, and materials development.

The instructional paradigms developed to govern the new program are geared towards the training of the student engineers in the practice of distance teaming. Specifically, from the freshman year on, the students will be involved in engineering design projects, and the team members will be intentionally distributed such that each student has maximum exposure to working with another team member "on the wire."

This new instructional paradigms involve more computer oriented instructional support (we are currently making extensive use of the web, and are experimenting with Lotus Notes as well) than is currently common in this type of program. Further, extensive use of distributed workgroup tools such as the newest versions of the office productivity suites which strongly support collaborative work via the Internet is encouraged and often required. Students will gain first-hand experience in distance teaming concepts such as problem solving, round-table discussions and brainstorming sessions, and project management, while working with each other on the wire.

The technology to be used in the program currently includes personal computer-based workgroup software and standards-based teleconferencing equipment. The telecommunications equipment operates over standard ISDN lines allowing any site with ISDN capability access to the instructional material. The majority of personal computers today are easily adaptable to the multimedia requirements of the program, and it is widely expected that most new computers sold in the near future will have the capability built in from the factory. The addition of the ISDN-compliant card is a simple and inexpensive enhancement to the computer.

While the new Computer Engineering program started operations bilocated between the two residential campuses of ERAU, there are plans for expansion into workplaces and communities where there are few opportunities for attaining a degree program of this type. Specifically, ERAU operates a large number of Extended Campus sites in often-remote industrial or governmental locations. With adequate-speed ISDN datacommunications lines, and relatively inexpensive computer peripherals, any student at any location would have the same opportunities as the students at the residential campuses.

## Expected Enhancements

The fundamental thrust of the distributed Computer Engineering program described by this paper is a significant departure from most current undergraduate programs. Some innovative programs are attempting to *encourage* students to use electronic messaging systems in a simulated environment during the course of a class or project. Unfortunately, "hall talk" and "getting together for a beer" reduce the isolation effects of the simulated distance. In contrast, ERAU's new engineering program will *structurally require* that students become comfortable with telecommunications technology, since the members of the project teams will be scattered between Arizona and Florida.

This also has ramifications beyond the initial performance of recent engineering graduates. With long-standing experience and understanding of the issues involved with distance teaming, these graduates would presumably be in a position to evaluate and optimize the collaborative environment of their employers. With improved team management, efficiencies, and problem-solving skills, these companies would become more competitive and capable in the world markets.

The applicability of this use of technology is easily used by any organization. The equipment is relatively inexpensive and is easily obtained. The setup and configuration of the equipment (from a technical point of view) is fairly simple, requiring only standard networking skills typically found in any computing and telecommunications services department. The primary disincentive for most organizations today is the significant cost of telecommunications lines; a problem expected to diminish as time goes on.

The goal of this new program in Computer Engineering is to prepare ERAU's student engineers more effectively for the industrial workplace found upon graduation. Two metrics will be used to determine the success of the overall program, technical skills befitting every computer engineer, and distance teaming skills befitting a distance teaming-trained engineer. The Computer Engineering program will be measured for technical effectiveness using standard ABET criteria.

The evaluation of the distance-teaming metric will be accomplished by a comparison with existing performance standards for classroom and laboratory accomplishment in similar, but non-distance teamed, Electrical Engineering and Computer Science coursework. An instructor-mediated comparison between two similar groups of students, using the Electrical Engineering/Computer Science programs as control groups, will allow analysis of the new instructional paradigms.

## Conclusions

The nature of engineering in today's industrial marketplace is increasingly becoming distributed throughout the world. Today's engineers are expected to extensively collaborate with other members of a design team, while never meeting face-to-face. Current engineer undergraduate programs typically do not include any training in the arts of distance collaboration, a rather severe omission given today's industrial practices.

A new program in Computer Engineering has been constructed that will structurally include the concept of distance teaming, the ability to work with other members of engineering design teams in geographically diverse areas. This new program is expected to give students a strong understanding of the ways that telecommunications can be effectively used in the distributed engineering team environment.

## Autobiographical Sketches

**Dr. Whetten** has worked as a design engineer and project leader, involved in all aspects of design and development of microprocessor-based industrial process control systems. More recently, he has architected and supervised construction of a number of local area networking projects, implementing enterprise-wide solutions to non-homogeneous platform connectivity problems. He also spent six years working under contract to major aerospace firms, performing theoretical and experimental analysis on high-performance microwave antennas, validating results and optimizing antenna designs. He has taught electrical engineering at Embry-Riddle since 1993, currently holding the rank of Associate Professor. In addition to his duties in the EE department, he founded and developed the Prescott Distance Education program, and currently serves as its Director.

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**Dr. Kornecki** has teaching and doing research experience with University of Mining and Metallurgy in Krakow, Poland (1970-1980), Garyounes University in Benghazi, Libya (1980-1983), and the University of Kentucky in Lexington (1983-1985). He joined ERAU faculty in 1985 doing research and teaching various courses: computer organization (digital logic and microprocessors), discrete structures, modeling and simulation, real-time systems. In 1988 he supervised the first group of computer program students developing software in the Air Science Simulation Laboratory. He contributed to research on Intelligent Simulation Training System and served as a visiting researcher with the Operations Research Service of the Federal Aviation Administration (1992). He has also been involved in various activities of the Society for Computer Simulation, including serving on SCS Board of Directors.

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# Distance Teaching and the Culture of Institutional Rewards

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The use of communications technologies for teaching is gaining in both popularity and acceptance. Faced with declining resources, increased public scrutiny, and pressures to accommodate the needs of a changing student population, colleges and universities look to innovative uses of technology as supplements to and alternatives for mainstream instruction. As is evident from the widespread interest in on-line instruction, faculty in increasingly greater numbers are becoming involved in distance/distributed education.

Similar external pressures have raised concerns about faculty productivity, compensation, and rewards. The issues of providing greater access to higher education and using technology add a new urgency to the debate about defining scholarship (e.g., Boyer, 1990) and reforming the reward system (e.g., Diamond, 1993). While faculty deserve to be equitably rewarded for their participation in distance education, innovations and outreach activities have a history of being under-valued and poorly rewarded (Scott, 1984; McNeil, 1990). Are faculty being rewarded for distance teaching? How does faculty participation in distance education figure into the promotion and tenure equation?

This presentation reports the findings of a study that examined the relationship between distance teaching and the institutional reward system. Building on the results of a previous survey that identified the reward practices of forty-five western institutions, this study took a closer look at the institutional reward systems of four Carnegie Category I (research) institutions. Using a qualitative approach, data were collected through semi-structured interviews with thirty-four individuals representing faculty, distance education program administrators, and chief academic officers. The picture that emerges through the constant comparison of the data helps us to better understand the culture of rewards for distance teaching.

## Institutional Context

### Priority and Commitment

The institutions represented in this study share a similar tripartite mission consisting of teaching, research, and service, and reflect the changing climate in higher education. They, as colleges and universities nationwide, are under considerable external pressure to hold down costs while providing high quality education and greater access. In an effort to respond to these challenges, a number of institutions have sought solutions in distance education.

Extending their influence beyond the physical campus and employing alternative delivery methods are not new. As land grant universities (with one exception), these institutions have a history of and commitment to outreach activities. Indeed, along with teaching and research, extension (service) remains an integral part of the universities' mission. Distance education is closely aligned with and a "logical extension" of the university's land-grant mission.

But is distance education a priority at these research institutions? The concept of distance education is included in their vision statements and planning documents. At several, distance education is specifically stated as a goals. However, at another (the only university that is not a land-grant institution), the expressed commitment to distance education is less explicit.

Although it may be a stated institutional commitment, distance education is a low priority. This is not to suggest, however, that university presidents lack interest in or support for distance education. Rather, in a time of diminishing resources, distance education competes with higher priorities; "it's one voice among many" in institutions that have "other, bigger fish to fry."

> There's a recognition at the top that this [distance education] is important and that probably our future enrollment is tied to this kind of effort; it's just that this isn't an attention-getter on the same scale as [other priorities].

Within the institutions, some academic units were quick to realize that distance education could help them fulfill their outreach mission. Programs such as nursing, engineering, and business embrace a variety of distance delivery methods to extend their reach and provide greater educational access to students in their state and even nationally and internationally. It is in these colleges and departments, more so than at the institutional level, that we find commitment to the concept of distance education. In academic units where strategic programs have been identified for distance delivery, distance education receives a high priority.

### Values and the Reward Structure

To encourage productivity and high performance, organizations establish mechanisms for motivating and rewarding their employees. Through extrinsic rewards such as salary increases, fringe benefits, promotion, and recognition, organizations reflect their values. In higher education, institutions convey their values through a reward system that can range from royalty payments to formal awards. While it may consist of a number of extrinsic incentives and rewards, the institutional reward system is dominated by the promotion and tenure processes. Within these processes, faculty productivity and performance are measured in terms of research, teaching, and service.

As with other Carnegie Category I universities, research figures prominently in the rewards system of the institutions represented in this study. Though they are expected to contribute in all three areas, faculty clearly perceive that research is the top priority, valued and rewarded over both teaching and service. The following response is typical:

> Teaching counts, but it's not enough. It's the research and scholarly activities of faculty that are really what make or break their chances for promotion. . . . The bottom line with promotion and tenure is you can teach 'til you're blue in the face, but if you haven't been productive in refereed journal articles and books, you don't make the promotion grade, so those are challenges we deal with that, I'm sure, are not unique to us.

Reflective of current directions in higher education, there are initiatives at these institutions to place greater emphasis on teaching. In various vision and planning documents, the institutions express their commitment to teaching. Yet despite efforts to elevate the status of teaching, a mismatch continues to exist between what is espoused and what, in actuality, is emphasized and, thus, rewarded.

In the traditional tripartite mission of category I institutions, service has typically been the least emphasized component. Extension and service activities are lower in priority and less valued than activities which can be clearly labeled as research or mainstream teaching. One institution, represented in this study has been engaged in extensive self-study and policy revision to better integrate the role of university extension teaching and service into the reward structure of the university.

Is distance teaching valued as a scholarly activity? From an institutional point of view, the answer to the question is "no." "It [distance teaching] wasn't perceived to be what . . . the faculty of a high quality institution—a research institution—would do . . . even though we have always been a land-grant university." Departments and colleges, however, value distance teaching because their distance education program serves as a vehicle for accomplishing the unit's goals. Involvement in distance education is also a source of recognition that brings the unit and the contributions of its faculty to the attention of university, state and national leaders. It is within the context of the academic unit, more so than at the institutional level, that administrators recognize faculty efforts and reward them according to department or college priorities.

### Policies and Guidelines

Policies and procedures outlined by the university convey the institution's values and codify reward processes. Aside from traditional correspondence study, distance education is a relatively new venture on most campuses and, with the exception of policies and procedures governing continuing education, there are few written policies that address distance education issues. The first phase of this study (Wolcott & Haderlie, 1996) identified a wide variability in compensation, workload, or reward, and found no standardization and little consistency in such practices across institutions, academic units, or delivery media.

One area in which procedures and policies are usually well-established is that of tenure and promotion. Such policies outline the processes by which faculty are awarded tenure and advancement in rank, and, as indicators of what the institution values, provide guidelines for assessing the productivity and performance of the faculty.

The promotion and tenure guidelines of the universities in this study do not specifically mention participation in distance education as an activity for which faculty should receive credit; nor, it should be emphasized, is distance education specifically excluded. In the language of the documents, however, distance education is implied in wording such as "outreach" and "extended education." Although there are inferences, distance education is not explicitly identified as an area of professional practice which serves as a measure of faculty productivity.

## Reward Dynamics

### Making It Count

Receiving credit for distance teaching and its related activities is a paramount concern for faculty. At issue is whether such activities are credited and how much weight they are accorded toward tenure and promotion. Potentially, a faculty members' involvement in distance education could count toward any of the three components that are typically considered in the promotion and tenure review process: teaching, research, and service. As might be expected, credit for distance education activity falls under the category of teaching where it contributes to the individual's overall teaching record or counts as a teaching innovation. Although several interviewees contend that distance teaching should be weighted somewhat more heavily than conventional teaching, the prevailing opinion holds that, at the very least, distance teaching should count no less.

Distance education is sometimes counted as service; faculty receive credit for "reaching people who normally wouldn't have been reached." However, when credited in this "least weighted category," distance education activities have little affect on advancing one's case for tenure and/or promotion. On-going efforts to redefine service/outreach and revise tenure and promotion guidelines accordingly may offer faculty greater visibility for technological innovation and distance education activities.

There is no apparent advantage to participating in distance education in terms of research credit especially in disciplines such as engineering or business. When there is a strong connection with the discipline, as in nursing education, faculty may received credit for research, publications, grants, and presentations related to distance teaching and learning or to their program's outreach efforts.

While faculty members and administrators alike are quick to note the significant amount of preparation that distance teaching requires, faculty receive little, if any credit for instructional materials produced in association with their distance education courses.

Though "not highly related to promotion and tenure decisions" at the institutional level, distance teaching is not a disadvantage. The comments of one faculty member illustrate its negligible effect:

> Doing distance ed [sic] doesn't really help you specifically; if anything, you've got to do all the other things and distance ed [sic], [too]. . . . I don't think it does do you any harm in terms of merit, tenure, promotion, but I'm not sure it really facilitates you either.

At best, distance teaching might round out an already strong portfolio.

> If I had to guess, I would say if a person is diligent about the research and scholarship side . . . probably their chances are enhanced by doing this. They gain a reputation, they may gain some prestige with their peers, [and] if their department sees this as supportive of its mission, they get a few extra brownie points there.

### Supporting Distance Teaching

Indeed, it is at the department level and during annual performance reviews that faculty work in distance education is acknowledged and credited. As promotion and tenure considerations progress beyond the unit, the importance of one's contribution to departmental initiatives (such as distance education) pales. The department as the locus of commitment to distance education becomes the source of rewards for related activities.

Department heads and deans have an important role to play. They are key in seeing that faculty work is rewarded consistent with both unit and institutional goals. Their task, as the respondents describe it, involves articulating priorities and making faculty "feel comfortable" that what they do counts not only in the academic unit, but in a larger rewards context as well.

But upper administration also sets the tone; coordinated efforts between administration at both levels is crucial.

> Your provost needs to be behind it [distance teaching]. They have to make a very clear, definitive statement that this is how we reward you for your development time; this is how we reward you for your delivery. . . . you would hope that faculty could be rewarded for their distance activities in such a way that it carries some weight in their annual evaluations . . . that has to come from the top. The department head cannot take the chance of saying to a faculty member, "Hey, I'm going to reward you for doing this distance course" when, in fact, maybe they can't deliver on their promise.

This is especially crucial for non-tenured faculty.

> Junior faculty need to know that this is an important component of their tenure decision, promotion decision, and probably need to be reassured that just because they're teaching a distance education course doesn't mean that they won't be given enough time to do research and scholarship, and that their contribution in the distance education arena will be viewed as a very important contribution to their teaching aspect of their performance evaluations.

The tone set by administration influences the degree of faculty participation in distance programs. When academic units endorse distance education and faculty perceive that their efforts are valued and rewarded, then it is easier to recruit faculty to and maintain their interest in distance teaching.

### Running the Risk

The effect of participating in distance education is not always so benign. There are downsides that range in severity from uncertainty about whether and how much credit will be accorded, to placing one's career in jeopardy for engaging in distance education to the detriment of discipline-based research and scholarly publication.

As a relatively new enterprise somewhat out of the mainstream at research institutions, distance education is a source of anxiety for tenure-conscious faculty for whom existing institutional policies provide few answers. In the "tenure and promotion sweepstakes," distance education adds an(other) element of risk.

> How much credit will they get for it? You know that if you spend your time writing a peer-reviewed journal article, the value of that is fairly well known as a commodity, whereas doing a service or an extended education workshop, things like this . . . there's a risk involved because it's not been quantified. There's not enough experience for people to know the value of those kind of efforts.

Beyond the issue of credit, distance teaching can present a less direct, though substantial obstacle to achieving tenure or advancing in rank. It can "work against you" by diverting time away from those activities that are more highly valued and more readily rewarded by the institution. In the demanding role of faculty at research institutions, distance teaching often amounts to trading-off "the other things that are more likely to get them promoted." For most faculty, that means the loss of time to devote to their scholarship. An associate professor tells of her experience:

> Well, it can really eat your time up. . . . in fact, our classes have become quite unmanageable [in terms of size]. . . . This semester wasn't nearly as bad, but in most semesters I just plan on not doing any research.

The risks pose a particular danger for the junior faculty member. Nontenured faculty members can find themselves caught in a squeeze among departmental initiatives, the demands of their position, and their own personal motivations. Both administrators and peers caution junior, nontenured faculty against involving themselves in distance education and other service and outreach activities at the expense of research and scholarly publications. The common advice: "get through the tenure process" first.

The potential negative affect on the careers of nontenured faculty members has implications for recruiting faculty to distance education. Cognizant of the risks to junior faculty, some of those tasked with recruiting distance teachers focus on the higher-ranked faculty. However, driven by mid- and latter-career motivations, senior faculty may be more difficult to recruit. They may see little benefit in distance teaching compared to the draw of activities having greater financial and ego-enhancing rewards. When senior faculty opt not to teach at a distance, those responsibilities fall to the younger, non-tenured faculty.

Success of distance education programs and other innovations requires that faculty find something in it for themselves—something more than intrinsic satisfaction. Faculty need to know that their investment of time and effort pays off in terms of what the university values and rewards. While intrinsic rewards may be satisfying enough to encourage faculty participation, more tangible and equitable rewards are needed to sustain faculty motivation. As a dean points out: "If they don't stand behind that commitment [to reward distance teaching], you're in for it . . . then the only incentive you've got left is purely money . . . but that won't leave you with a long-term program."

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## Autobiographical Sketch

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# Air Force Collaboration With Interactive Television

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## Abstract

The US Military Forces are currently using a wide range of distance learning media for education and training programs. This paper will support the live one-way video/two-way audio interactive television broadcast, USAF Collaboration With Distance Learning, from Maxwell Air Force Base, Alabama, to the University of Wisconsin Conference on Distance Teaching and Learning in Madison, Wisconsin. The ITV presentation and this paper will first look at the USAF development and use of interactive television (ITV) followed by identifying and discussing various USAF collaborative initiatives which provide a wide range of joint military service distance education and training programs. The presentation and paper will conclude by identifying and discussing some of the proven ITV distance learning benefits to the provider, students, and USAF. The presentation will encourage and utilize conferees' involvement and interaction to support and develop ideas as well as provide the opportunity for all participants to experience learning via interactive television.

## Introduction

During the past five years, education and training in the United States Air Force has been going through some significant changes. With continued manpower reductions and more stringent budget constraints, the Air Force, like our other military services, has turned more and more to the use of technology in education and training. This use of technology has been infused with a variety of new distance learning programs designed to provide increased learning opportunities at the best time and place, using sound instructional and economical criteria.

We will first look at the background and development of the USAF definition of distance learning. Next, we will develop a brief historical perspective and evolution of the USAF Air Technology Network (ATN) to its current status. This will lead to the crux of the presentation, a discussion of some of the many USAF collaborative distance learning initiatives using interactive television. The presentation will conclude by looking at the benefits of distance learning via interactive television to providers, students, and the Air Force.

## Air Force Collaboration With Interactive Television

**Distance learning defined.** From the late 1980s, through a wide range of conferences and publications, distance learning has been defined in a number of ways. A Distance Learning Resource Handbook, recently published by the USAF Distance Learning Office (AFDLO), lists 15 different definitions for Distance Learning. The list is headed by the official USAF definition, "structured learning that takes place without the physical presence of the instructor." This definition was first developed by Mr. Andy Andrews of the Cognitive

Systems and Engineering Group at the Los Alamos National Laboratory in Los Alamos, New Mexico. He has published numerous papers, principally regarding military doctrine and computer-based training. In October 1989, a distance learning conference was held at the Los Alamos Laboratories in which a group of highly respected representatives from the military, government, industry, and academia met to analyze the potential of distance learning to deal with common educational problems. It was for this conference that Mr. Andrews developed the distance learning definition later adopted by the Air Force.

This definition was found to clearly meet the needs of the Air Force concept of distance learning which encompasses traditional methodologies and media (including paper correspondence courses), as well as current advances in educational technology. By this broad definition, we can see that distance learning as an educational tool is not new. The military, including the Air Force, have been using a wide range of traditional distance learning media particularly since the beginning of World War II.

The use of "distance learning" versus "distance education" is also very appropriate to meet Air Force needs. The terms are frequently used interchangeably throughout the literature and academia; however, since the Air Force incorporates extensive education and training programs with a clear relationship but distinction between the two terms, the term "learning" applies equally for all Air Force education and training programs. Also, Air Force Manual 36-2236, Guidebook for Air Force Instructors, clearly states that Air Force instruction is designed for the "learner" or student centered as opposed to traditional teacher centered and therefore strongly emphasizes the outcome of "learning."

USAF Air Technology Network (ATN). In 1992, the Air Force Institute of Technology (AFIT) at Wright-Patterson AFB, Ohio, faced new educational requirements mandated by the Acquisition Professional Development council. Based on these new requirements, AFIT found it had a career development training requirement for thousands of students. With an annual resident student throughput of 300, AFIT turned to a non-traditional method of delivering training. Through the cooperation and support of the Defense Acquisition University, Headquarters Air Staff, and other agencies, the Air Technology Network was established to provide distance learning via interactive television (ITV). Using a satellite based delivery system, incorporating one-way video/two-way audio, AFIT broadcast its first course in late 1993. By the end of 1994 the yearly student throughput of students was over 3,000.

With the success of the ITV courses at AFIT, additional funding was approved to expand the Air Technology Network. In the spring of 1995, the second uplink distance learning television studio came on-line at Maxwell Air Force Base, Alabama. During this same period, satellite downlink systems were being expanded to Air Force bases throughout the continental United States. In September of 1995 the third uplink broadcast studio came on-line at Sheppard Air Force Base, Texas. In 1995 these three uplink studios delivered 28 courses to meet the education and training needs of almost 7,000 students.

Currently, there are four uplink broadcast studios (the fourth at Keesler Air Force Base, Mississippi, came on-line in September 1996) and 72 downlink (receive) sites at Air Force bases throughout the United States, including Hawaii and Alaska. As the network continues to expand to meet USAF education and training needs, additional uplink sites are being considered at Lackland Air Force Base, Texas, and Vandenberg Air Force Base, California. In addition, in October 1996, a highly successful live one-way video/two-way audio test broadcast of the system was conducted from Maxwell Air Force Base, Alabama, to Ramstein Air Force Base, Germany. This was the first step in moving towards overseas capabilities of the network. By the end of 1997, Air Force bases in Europe will be connected to ATN and perhaps by the fourth quarter of 1998, air bases in the Pacific should also be able to receive ATN broadcasts.

Collaboration: (1 to work together, especially in some literary, artistic, or scientific undertaking; 2 to cooperate with an enemy invader: Webster's New World Dictionary, 3rd ed. 1988) (Collaborate—*The Random House Thesaurus*, 1984—work together, team up, unite, create together, join forces).

### Satellite Education Network (SEN)

In 1985, the US Army Satellite Education Network began broadcasts as an analog network from its four studio uplink site at Fort Lee, Virginia. Early on, the Army recognized the need for special training for those who would be teaching via television and developed the Advanced Educational Technology Course, also at Fort Lee. In 1993, SEN had its network retrofitted to match the Air Force's digital ITV network using the same AT&T satellite making the SEN, with its 79 downlink sites, and ATN totally interoperable. On an as-needed basis, slots in the Advanced Educational Technology Course (AETC) were made available to the sister services to support their initiatives into interactive television. As AFIT began its broadcasts, they too recognized the need for special instructor preparation and the AETC was used to train a small cadre of Air Force instructors who would go on to develop two Air Force ITV instructor training courses at Maxwell Air Force Base, Alabama, and Sheppard Air Force Base, Texas. Mr. Ken Johnson, AETC Course Director, provided the Air Force graduates extensive support and materials needed to aid in the development of the Air Force ITV Instructor Courses.

Along with SEN the Army also uses T-NET, a satellite based, near full motion teleconferencing system reaching 118 sites throughout the country. This system, although a separate network, is also currently used by the US Air Force Reserve (AFRES) to reach 46 operational sites. The T-NET system differs greatly from the ATN and SEN and operates from a different satellite.

As distance learning, using ITV continued to grow, the Air Force and the Army were able to develop a technique to bridge the T-NET broadcast system to the SEN and ATN, providing the opportunity for Joint Services education and training programs across formerly incompatible satellite systems.

### Warrior Network

In 1993, the Air Force directed stringent new Enlisted Professional Military Education requirements for a standardized, in-residence, six-week course. This created a problem for most Guardsmen who would be unable to leave their full time jobs for six-weeks. As a result, the ANG looked to the educational and economical soundness of utilizing distance learning via ITV taught in the evenings using a university type schedule to complete the requirements of four weeks of the six-week course. The remaining two weeks of the course would be taught in-residence at McGhee-Tyson ANG Base, Tennessee. The result was the development of the Warrior Network, an ITV network with three uplink studios and 208 downlink receive sites throughout the United States. The Warrior Network uses the same satellite and system as the SEN and ATN and all three are completely interoperable. The initial cadre of the ANG ITV instructors received their training from either the Army AETC at Fort Lee, Virginia or the newly established Air Force Advanced Teleseminar Instructor Course at Maxwell Air Force Base, Alabama. The pilot class started in early 1995 and graduated 101 students including two active duty Air Force members. The pilot class was identified as the experimental group in a study to determine the comparative effectiveness of the new distance learning course. Control group number 1 consisted of 530 active duty Air Force students attending five different in-residence courses at five separate Air Force bases throughout the US. A random sample of 100 cases were selected from the original 530 samples to normalize the samples of the three groups. Control group number 2 consisted of 96 students attending the ANG six-week in-residence course taught at McGhee-Tyson ANG Base, Tennessee. The study was conducted by Air Force active duty and Air National Guard educators and researchers. The initial results showed no significant educational differences.

### Government Education and Training Network (GETN)

As the military satellite networks were developing and expanding, there also were a number of Department of Defense (DoD) agencies developing satellite-based interactive television systems. Through the encouragement and sponsorship of AFIT and ATN the idea of a single DoD ITV network was developed. As DoD agencies looked to distance learning by ITV, they were encouraged to use the TelStar 401 satellite which was supporting the military networks. As a result, the Government Education and Training Network (GETN) was born. GETN consists of almost 20 government agencies such as Defense Logistics Agency, Defense Information Systems Agency, Environmental Protection Agency, Federal Aviation Agency, Department of Education, Department of Internal Revenue, along with the three military networks mentioned above to name just a few. By the end of 1996 GETN had a combined total of over 1200 totally interoperable downlinks throughout the United States. On April 30 1996, a required government one-hour ethics course was broadcast live from Washington DC to federal employees around the country over the GETN network.

## Results

The use of these interactive networks have positive impacts within the total Air Force community as well as throughout the joint services.

### Intraservice Collaboration

The development of the Air Technology Network, The Warrior Network, and the Air Force Reserve (AFRES) T-NET has provided the Air Force Total Force (Active duty and Reserve components) a single vehicle in which to cooperate and collaborate on a wide range of education and training programs with a substantial cost savings from traditional classroom methods. An active duty Air Force enlisted member who may not be able to attend the six-week required Professional Military Education course is able to sign-up and take it via the ANG ITV program, as has already been the case. Larger numbers of ANG and AFRES members are able to take education and training courses via ITV with their Active duty partners.

The introduction of the Total Force ITV networks have aided in increasing the education and training opportunities for more members of the Total Force when they need it and created new areas for increased cooperation and collaboration.

### Interservice Collaboration

The use of ITV has provided new approaches to a wide variety of Joint Service education and training programs. The large numbers of people able to be taught at any given time and able to interact through the two-way audio system has opened a number of doors. On a number of occasions Army and Air Force faculty members have taught side by side from the same studio to Army, Air Force, and Air Force Reserve students at Army Posts and Air Force Bases across the country. Marine instructors have broadcast from the Maxwell Air Force Base studio in Montgomery, Alabama, and taught large numbers of students from other services scattered throughout the United States in support of Professional Military Education courses. Many students are now able to see and interact with content experts that they probably would not have ever seen or heard taking a traditional distance learning correspondence course.

## Benefits

The benefits are far reaching for both the customer and the provider.

### Customer

With the reduced activity on bases resulting from minimizing the number of people traveling to and from schools, the operations tempo (administrative paper work, financial arrangements, etc.) of bases is reduced. Tied very closely to this is the savings in costs for not having to send people to other duty stations or bases for schooling. The advent of the wide range of distance learning courses now available increases the training opportunities for Air Force members.

### Provider

For those tasked with providing education and training for the Air Force, distance learning offers the opportunity to increase the student throughput, as we have seen in some of the examples described earlier. Even with additional start-up costs, there generally is a long term cost avoidance or cost savings. These cost savings can be found in production costs as well as distribution costs. In many instances the course materials can be updated more quickly than rewriting and printing the traditional paper-based courses. The ability to easily update material is particularly true of live interactive television broadcasts. Because of the potential for extensive student interaction, distance learning courses provided through the current technology also have the potential to increase student participation and interest compared to traditional paper courses.

## Conclusion

The Air Force definition of distance learning, "structured learning that takes place without the physical presence of the instructor," has proven to be very functional in meeting Air Force needs. It allows for a wide range of distance learning media from traditional paper-based correspondence courses to the move towards teaching via the internet. Although the definition allows for a variety of distance learning media, we spent this time looking exclusively at the use of interactive television. The introduction of the Air Technology network in 1993 opened a new world in military education and training. The collaborative initiatives with the Satellite Education Network, the Warrior Network, and the Government Education and Training Network give just a glimpse of the potential for cooperation through the use of current technology in education and training. The results and benefits we have already seen through the use of interactive television has provided new doors that have not yet fully opened but have given us a peek at the unlimited potential for military education and training.

Although there are clearly some benefits in using current technology in distance learning, distance learning is not a panacea nor the answer to educators' problems. Not all courses are suited for current technology and distance learning. Each course must be evaluated on its own educational soundness and merit. Nor does the technological boom mean there is no place for paper-based correspondence courses; there still may be a sound educational place for them. Technology in education is not a means to an end in itself but another tool available to educators in making sound educational decisions. A part of those sound decisions is seeing the potential for broadened collaboration throughout the military and academia.

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### Autobiographical Sketch

**Mr. Wolfe** received his Bachelor of Science in Psychology from Troy State University of Montgomery, Alabama, in 1974 and a Masters degree in Guidance and counseling in 1976, also from Troy State University. In 1978 Mr. Wolfe retired from the USAF after more than 23 years of service. Over half of his Air Force career was spent as an Air Force educator developing and teaching courses throughout a wide range of Air Force education programs. In 1985, Mr. Wolfe returned to work for the Department of the Air Force as a civilian educator at the Air Force Academic Instructor School (AIS), "The Teacher's College of the Air Force." In July 1995, Mr. Wolfe was temporarily assigned to the newly formed USAF Distance Learning Office as Chief, Distance Learning Instructional Design and Evaluation Branch. He returned to his current position at AIS on 17 June 1996. Mr. Wolfe has given formal and informal presentations on Air Force Distance Learning initiatives at numerous distance learning conferences and workshops. His most recent paper, "USAF Initiatives in Distance Learning" was published in the Summer 1996 issue of The Journal of Instruction Delivery Systems.

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# Collaborative Learning Meets Knowledge Management in the Virtual Classroom

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## Introduction

Andersen Consulting is a global management and technology consulting organization. For nearly twenty-five years, training for our employees consisted primarily of instructor-led courses conducted at our central campus, supplemented by paper-based self-studies. This model accommodated the needs of roughly 20,000 professionals, most of them working in North America. During this time, it was financially feasible and educationally desirable to bring employees to our campus at key points in their careers for healthy doses of corporate culture and education. Today, however, Andersen Consulting employs over 45,000 people in forty-seven countries. To meet the needs of such a large, geographically dispersed population of learners, we are adopting more distributed educational approaches and increasing our reliance on knowledge sharing across borders and time zones.

## Educational Approaches

As Andersen has grown, our thinking about the most instructionally sound approaches for skill development have advanced as well. We have adopted new delivery strategies based on the target audience for the training (group or individual) and the overall objective (skill development or information/knowledge).

### Quadrants I, III, and IV

Working from our basic assumption that learning is performance-based, we have converted almost all of our structured classroom activities into more complex and engaging "goal-based scenarios" in the classroom. Additionally, in response to business pressures and learners' needs for just-in-time training, we have transformed other classroom courses into self-study multimedia goal-based simulations distributed via CD-ROM. The objective of these experiences is to build skills rather than to raise awareness about information or procedures. Similarly, most of our traditional paper-based self-studies have been replaced by multimedia digital magazines.

### Quadrant II: The Virtual Classroom

We have found, however, that some classroom events do not translate into any of these formats. Rather, some experiences are valuable because they provide a venue for learners to share experiences. For these collaborative learning experiences, we have developed the "virtual classroom"—a computer-based course which combines the flexibility of self-study CBT with the richness of group interactions in an asynchronous learning environment.

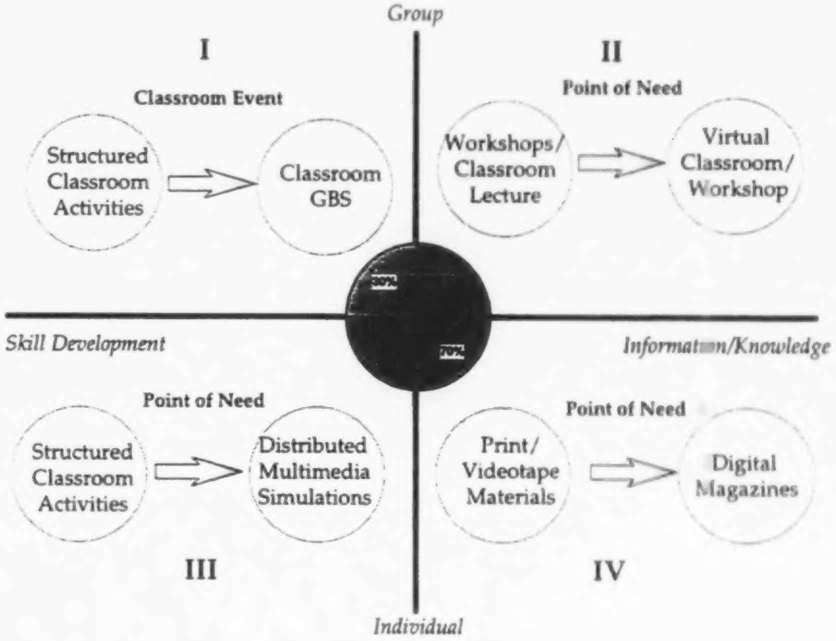

Group
I
Classroom Event
Structured Classroom Activities
Classroom GBS
II
Point of Need
Workshops/ Classroom Lecture
Virtual Classroom/ Workshop
30%
Skill Development
70%
Information/Knowledge
Point of Need
Structured Classroom Activities
Distributed Multimedia Simulations
III
Point of Need
Print/ Videotape Materials
Digital Magazines
IV
Individual

*Figure 1. Quadrant model of delivery approaches*

In addition to flexibility for the learners, this delivery approach also allows for training and work to occur concurrently so that participants can immediately apply what they have learned. From a financial perspective, travel and lodging costs are reduced. In terms of maintenance, the network-delivered software can be updated and extended so that developers are freed from the fixed course length models of CD-ROM software.

### The Role of Knowledge Management

Andersen Consulting has used Lotus Notes to create a firm-wide knowledge sharing system called the Knowledge Xchange® (KX). This system is a collection of databases which house methodologies, industry news, best practices, firm tools, and discussion databases that support communities of practice. Essentially, is a virtual place where Andersen Consulting personnel can build and share knowledge to form a global electronic community of practice. This "intranet" system serves as our worldwide information publishing service. More importantly, it is an information repository where Andersen Consulting personnel can leverage the collective experiences of the entire organization. The various discussion databases are tied to communities of practice, allowing individuals performing similar roles to have a constantly evolving distributed discussion and reference environment.

## Collaborative Learning Meets Knowledge Management

The virtual classroom has brought us closer to realizing the power of integrating learning with the Knowledge Xchange. Prior to development of the virtual classroom, the only learning done using the KX was in the form of self-study knowledge dissemination—essentially electronic publishing to individuals. The design of the virtual classroom leverages both the information and the electronic communities. To date, Andersen Consulting Education has developed two virtual classroom solutions.

### Change Fundamentals

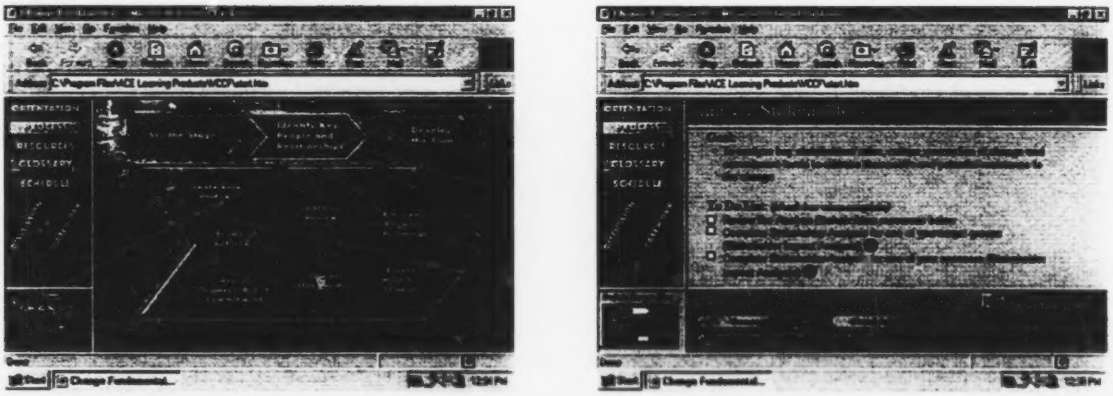
This course combines the time- and place-independence of self-study with the best features of classroom learning—highly engaged learners with an effective teacher/coach as a guide. Unlike classroom or self-study, however, Change Fundamentals is designed to be taken in small increments over extended periods of time. The course lasts 12 weeks, with a case study "deliverable" due every two weeks.

Participants use their real client projects as case studies through which they learn change implementation concepts, tools, and techniques. The course is divided into three modules, and each module consists of several discrete activities. For each activity, participants review the goal, a "to do" list, and several resources they may use to create the deliverable. These resources include war stories from experienced practitioners, job aids, and links to other databases in the Knowledge Xchange. Participants post their completed deliverables to the classroom database where they are reviewed and discussed by peers and faculty. Most of these discussions are conducted asynchronously through Lotus Notes databases, but learners may use telephones and video conferencing to facilitate real-time discussions.

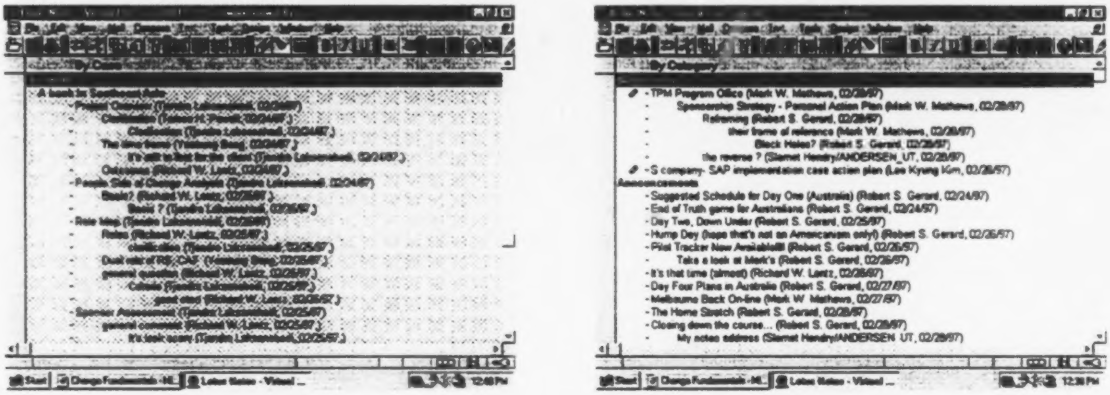
### eCommerce Video Presentation Support

The second virtual classroom solution is a smaller, mostly self-contained module that more closely resembles a self-study. Neither registration nor tuition is required, as users order and receive the training software through electronic mail and install and complete it at their convenience.

This product was built to support the use of a promotional video intended to sell the concept of electronic commerce to clients. The video is divided into seven discrete segments, each containing very abstract images and narration. The course is intended to help people understand what the main message of each segment is and to help develop a "community of practice" around the use of this selling tool. To do this, participants review a text transcript, the key points to consider, and several stories and electronic commerce examples for each segment of the video. Then, after they have used the video, they submit their feedback on how the client reacted to the video, their assessment of its effectiveness as a selling tool, and general lessons learned to help others in the community learn from their experience.



Participants navigate through the overall course flow and identify the specific activities to be completed.



By Category

- TPM Program Office (Mark W. Mathews, 02/28/97)
  - Sponsorship Strategy - Personal Action Plan (Mark W. Mathews, 02/28/97)
    - Reframing (Robert S. Gerard, 02/28/97)
      - their frame of reference (Mark W. Mathews, 02/28/97)
        - Black Holes? (Robert S. Gerard, 02/28/97)
    - the reverse ? (Slamet Hendry/ANDERSEN_UT, 02/28/97)
- S company- SAP implementation case action plan (Lee Kyung Kim, 02/28/97)

Announcements

- Suggested Schedule for Day One (Australia) (Robert S. Gerard, 02/24/97)
- End of Truth game for Australians (Robert S. Gerard, 02/24/97)
- Day Two, Down Under (Robert S. Gerard, 02/25/97)
- Hump Day (hope that's not an Americanism only!) (Robert S. Gerard, 02/26/97)
- Pilot Tracker Now Available!!! (Robert S. Gerard, 02/26/97)
  - Take a look at Mark's (Robert S. Gerard, 02/26/97)
- It's that time (almost) (Richard W. Lentz, 02/26/97)
- Day Four Plans in Australia (Robert S. Gerard, 02/27/97)
- Melbourne Back On-line (Mark W. Mathews, 02/27/97)
- The Home Stretch (Robert S. Gerard, 02/28/97)
- Closing down the course... (Robert S. Gerard, 02/28/97)
  - My notes address (Slamet Hendry/ANDERSEN UT, 02/28/97)

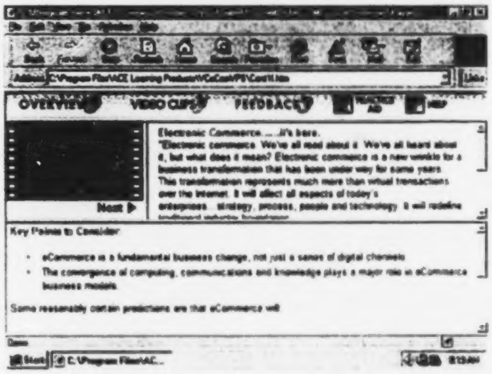
Once completed, deliverables are posted to the case area of the classroom, while general discussions are conducted in another part of the classroom.

*Figure 2. Change fundamentals course flow*

## Implementation Challenges

While the virtual classroom delivery approach offers several advantages from a learning and knowledge sharing perspective, we have encountered some challenges in implementing it within Andersen Consulting. From a cultural perspective, many employees value training to the extent that it serves as a vacation from, or at least an interruption of, their normal work routine. Training delivered through the virtual classroom is sometimes seen as a low priority compared to more pressing work. These challenges are true of all self-study methods, but in this environment compliance issues are much more visible because participation can be tracked through the learners' connectivity to the network.

With respect to knowledge management and sharing there are many challenges as well. While our performance appraisals do include an evaluation of the employee's knowledge sharing efforts, the motivation to contribute to the Knowledge Xchange is still largely intrinsic. Additionally, some users are frustrated by the technical requirements and technical performance associated with dial-up connectivity to our intranet.

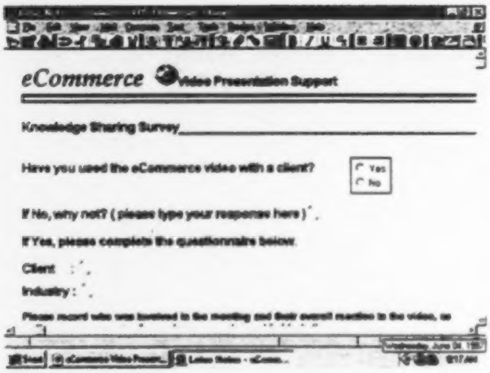


Electronic Commerce......it's here.
"Electronic commerce. We've all read about it. We've all heard about it, but what does it mean? Electronic commerce is a new vehicle for a business transformation that has been under way for some years. This transformation represents much more than virtual transactions over the Internet. It will affect all aspects of today's enterprises... strategy, process, people and technology. It will redefine

Key Points to Consider

- eCommerce is a fundamental business change, not just a series of digital channels
- The convergence of computing, communications and knowledge plays a major role in eCommerce business models

Some reasonably certain predictions are that eCommerce will



eCommerce Video Presentation Support

Knowledge Sharing Survey

Have you used the eCommerce video with a client? ○ Yes ○ No

If No, why not? ( please type your responses here )

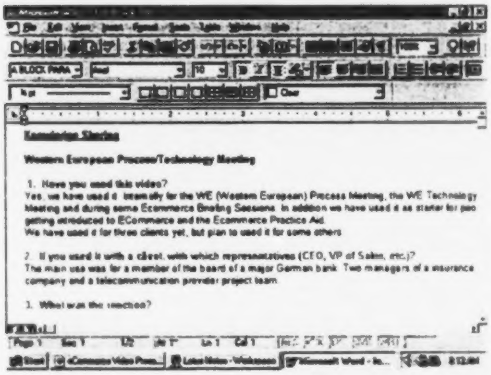
If Yes, please complete the questionnaire below.

Client :

Industry :

Please record who was involved in the meeting and their overall reaction to the video, as

After reviewing the course content, users contribute their own experiences with using the video.



Knowledge Sharing

Western European Process/Technology Meeting

1. Have you used this video?
Yes, we have used it internally for the WE (Western European) Process Meeting, the WE Technology Meeting and during some Ecommerce Briefing Sessions. In addition we have used it as starter for people getting introduced to ECommerce and the Ecommerce Practice Aid.
We have used it for three clients yet, but plan to used it for some others.

2. If you used it with a client, with which representatives (CEO, VP of Sales, etc.)?
The main use was for a member of the board of a major German bank. Two managers of a insurance company and a telecommunication provider project team.

3. What was the reaction?

Users can also review the "knowledge sharing" contributions of others.

*Figure 3. eCommerce course flow*

## Conclusion

This is an exciting time in education. For the first time in many decades educators are truly innovating. We are moving from a model where education or training was associated with an "event" to a model that makes learning a continuous process. Within the next few years, Andersen Consulting professionals will experience a curriculum in which they are always engaged. Just as exciting is the rich and open reference environments such as our own KX and similar systems being brought on-line in other organizations—all of which exist against the backdrop of the public internet. These networked repositories are refreshing dynamic libraries in which learners can be depositors as well as borrowers. The life-long learner is not only a participant in the system but an integral component of it.

## Autobiographical Sketches

**Jane Zeiss** is an Instructional Design Manager with Andersen Consulting Education. Her responsibilities include instructional design and project management for a variety of education products ranging from integrated performance support and classroom goal-based scenarios to virtual classrooms. She holds a B.S. in business administration from the

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# Teaching on Television
## From Concept to Evaluation

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### Introduction

The purpose of this paper is to describe an integrative and flexible method of effective teaching on television for educators who intend to interact with and engage the distance learner. This paper is based on a graduate level course in teaching and learning by television taught by the author at the State University of New York. The course is designed as an intensive workshop consisting of five days, eight-hour per day, and a follow-up day. The course is intended for those participants with no experience in teaching on television. In the last two years, the authors has conducted several training workshops for K–12 teachers in the central New York region based on a contracted version of the course.

### Background

The idea of teaching on television is as old as the television medium itself. The evolutionary process from instructional television to educational television and television as a tool of distance education delivery has constantly raised the question of teaching effectiveness on television as compared to effectiveness of teaching in a traditional classroom setting (Schramm, 1977, Willis, 1993). Such an ongoing inquiry has generated an interesting proposition: while traditional classroom teaching has continually fared as the most effective method of teaching, a distance education course taught by a competent teacher with a well designed instructional television lesson and appropriate educational technology is equally effective. This proposition has created a stimulating challenge for today's educators who choose to teach from a distance using the medium of television. These educators desire something far more than a "talking head" performance. They also seek the same or higher level of learner engagement as they do in the traditional classroom. They are also aware of the alarming fact that in American culture the medium of television is synonymous with entertainment . Therefore presenting a serious topic in a formal manner on television can be risky when the presenter is not knowledgeable about the language and idiosyncracies of television as an instructional medium.

### Course Structure

A viable solution to the above concerns is an integrative and flexible method of teaching on television. An integrative method here means bringing together relevant and compatible concepts and practices from the fields of mass communication, specifically television production, and education. Such an integrative approach consists of several components. The integral components are: (1) instructional design, (2) television production techniques and performance, (3) methods of engaging the learner, and (4) evaluation methods. Other components include a review of relevant cognitive learning theories as they apply to learning from television, application of visual graphics and computer-generated images, use of multimedia technology, and copyright issues. Treating these components and related topics as course units, each unit is designed to address both conceptual framework and hands-on opportunities when appropriate. Ample time is allotted for the participants to practice what is learned in each unit. At the end of the week-long workshop each participant is required to produce and present a sample of his/her lesson on the camera.

This course is also designed with flexibility in mind. Each course unit is self-contained. As such, based on the needs and proficiency level of the course/workshop participants, only certain required course units can be taught without sacrificing the quality or continuity of the course content or the learning process. What follows is a brief review of the seven course units which constitute the framework of the course.

### Unit One: Television and Learning

**Concept.** This unit functions as an introductory session. A brief history of television as an instructional tool is presented. Then, the relationship between some of the cognitive development and cognitive-based learning theories (Kolb, 1976; Winn, 1990), on one side, and comprehension of television codes and images (Bryant & Zillmann, 1991), on the other side, is discussed.

### Unit Two: Instructional Design

**Concept.** It is not unusual for veteran educators to teach with full ease and minimum challenge to the point that effective classroom teaching becomes their second nature. However, once the modality of teaching and learning shifts from conventional classroom environment to teaching by television and from a distance, these educators have to shift paradigm, so to speak, and rethink their teaching methodology. This is where instructional design becomes an essential component in the new learning process.

Kemp (1977) defines instructional design as "the process of systematic planning that establishes a way to examine instructional problems and needs, sets a procedure for solving them, and then evaluates the results" (p. 7). The purpose of instructional design is to assist the educator in their teaching activities to meet the needs of each individual learner within the broadest possible boundaries. In other words, "the goal of instructional design is to maximize individual learning potential" (Jonson & Foa, 1989, p. 4).

There are several competing schema regarding the steps involved in the instructional design process. In a nutshell, the process consists of design, development, evaluation, and revision. In the course the author uses a modified version of the instructional design model suggested by the Christie (1996). The Christie Communications Sequential Construct (CCSC) is a learner-centered, objective-based, and criteria mastery model. The following steps, based on the CCSC model, are discussed in the course:

- Identify and state needs
- Analyze the learner
- Develop goals and behavioral objectives
- Develop evaluation methods
- Identify instructional constraints
- Research and select content
- Select presentation methods and relevant media
- Prepare materials (storyboard, script, visuals, tests, handouts)

- Conduct formative evaluations (Beta testing)
- Revise materials/systems
- Execute the program
- Conduct summative evaluations

**Practice.** Participants are asked to identify the needs of their students, to describe their students' demographically and psychographically, to consider a specific lesson, and to develop goals and objectives for the lesson. Participants are encouraged to share their work with one another in small groups and to seek feedback from each other or from the instructor. The small group interaction method is reinforced during the practice session of each course unit when appropriate.

### Unit Three: Scripting Lesson Plan

**Concept.** The pivotal point for a successful teaching on television is thinking visually. The television teachers should fully understand and appreciate the potentials of television and learn how to exploit the visual power of the medium in order to enhance their teaching effectiveness. In this unit, the advantages and disadvantages of teaching on television as compared with traditional classroom teaching are discussed. Then the responsibilities of the teacher as producer, director, and performer are explored, and the concept of television script as a connecting point among the three roles is emphasized. The goal of this unit is to teach the participants how to think visually and how to convert their lesson plans into a script. Standards of scripting are discussed and the advantages and techniques of using a storyboard in conjunction with a script are elaborated.

**Practice.** Each participant spends some time to visualize his/her presentation of the lesson and consequently creates a storyboard and a script based on the nature of the lesson plan, goals and performance objectives.

### Unit Four: Performing on the Camera

**Concept.** In shifting from a conventional classroom teaching to teaching on television, the educators should feel comfortable to perform in the presence of the camera and accept the fact that becoming an entertaining teacher is not synonymous with being a foolish clown. In the first half of the this unit participants become familiar with the elements of television production such as picture composition, camera movements and remote/panel control operations, sound control, and lighting for television. These topics are presented in a simple and concise language and as they relate to the purpose of teaching on television. Special attention is also paid to the characteristics and uses of the document camera (Elmo).

Once participants feel technically competent, the second half of the unit focuses on performance techniques and tips. This section covers topics such as image control, appearance, eye contact and other nonverbal cues, voice manipulation, teacher immediacy, and interaction with the script, the learner, and the technology. The goal of this unit is to help participants become confident in their camera performance and evoke empathic responses from their audience—the classroom learner as well as the distance learner.

**Practice.** Each participant presents a short sketch based on his/her script (lesson plan), or similar to it, which is videotaped and later played back and critiqued. Participants are asked to observe and examine the recorded sketch and provide a self-evaluation of their performance.

### Unit Five: Graphics and Computer-Generated Visuals

**Concept.** A successful television lesson is measured by the extent to which the non-spoken portions of the lesson are captivating and inspiring the learner and facilitating the learning process. Effective visuals can also enhance remembrance. Graphics and objects which complement the oral presentation part of a course content also reinforce the learning process. In this unit different modes of visual presentation, including still images, slides, hand-made and computer-generated graphics, animation, and video clips, are examined and effective uses of each is suggested. A set of guidelines regarding the proper and creative aspects of making textual graphics for presentation on television screen is also presented. The principles of simplicity, readability, and color/style compatibility are equally emphasized.

**Practice.** Participants begin to create sample graphics of what they will eventually be using in their project. Those who need assistance with creating computer graphics are helped. Participants are also encouraged to camera test their graphics in order to assure the appropriateness of the graphics in terms of their aspect ratio and compatibility.

### Unit Six: Engaging the Learner

**Concept.** Educators have always been concerned with the issue of learner participation. Obviously effective classroom teaching, which includes teacher immediacy, can maximize learner participation and enhance the learning process. On the other hand, physical distance between the television teacher and the remote learner, compounded by the absence of teacher immediacy, justifies the concern over inadequate participation by the distance learner. As Winn points out, "The responsibility for effective interaction falls squarely on the shoulders of the instructor" (1990, p. 62). What is needed is an articulated and well planned interaction strategy to guarantee the engagement of the distance learner in the learning process before, during, and after the television lesson. The emphasis in this unit is on how the learner can be motivated to interact with the teacher, the medium, the content, and other learners in the distance learning environment. In addition to focusing on motivational skills and questioning techniques, other topics related to interactive television such as the quadrilateral interaction process suggested by Hillman, Willis, and Gunawardena (1994) will be presented. The unit also focuses on the role and contributions of the remote site monitor to the process of engaging the learner.

**Practice.** Participants reflect on what has been effective in their interaction with their students/trainees. They are also asked to draw a list of their favorite speakers and to discuss what makes these speakers an engaging performer. Further, each participant briefly presents a topic of his/her interest and tries to engage the other course participants in the topic using some of the techniques covered in the unit.

### Unit Seven: Evaluation Methods

**Concept.** By their nature, humans are value-oriented. In every day life, they go through the process of observation, interpretation, and evaluation. Educators are not exempted from this process. They are accustomed to creating and using a variety of measurements to assess students' performances. They are also used to being evaluated by their peers and their students. However, educators need to be cognizant of other types of evaluations such as needs assessment, formative and summative evaluations of instruction and content, and technology assessment. Educators should learn how to design and execute theses evaluation methods in both quantitative and qualitative forms and in all phases of teaching on television. These evaluation methods are discussed in this unit.

While the course participants take part in the above units, they work on a proposed lesson plan inside and outside the class time to prepare the lesson for camera presentation. Generally, a part of the course is devoted to rehearsal sessions so the participants become more comfortable and confident with their presentations. The last day of the course is used for videotaping and critiquing of each individual presentation.

At the commencement of the week-long course the participants plan on a future one-day meeting. The purpose of this meeting is to bring in a videotaped copy of their actual teaching on television in order to demonstrate how they have utilized their new knowledge and skills. They also discuss difficulties faced in teaching on television and other related experiences and reflections.

## Summary

Teaching on television is exciting yet challenging. To respond to the challenge, educators need to rethink and retool their teaching methods and to understand the language of the television medium. The Teaching on Television course/workshop prepares educators for effective adaptation of their classroom teaching skills to teaching on television and for successful engagement of the distance learner in the learning process. The course can be taught as a graduate-credit carrying course or as a contracted workshop of two or three-day length. While the course units and related topics are inter-related, they can be offered independently due to the flexible design of the course. In either format, the course/workshop participants will learn about the essential concepts and practices of distance education by television from instructional message design to learning outcome assessment.

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# ❖ Tutorials & Workshops ❖

# It's Show Time:
# Preparing for Teaching on TV

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Professor and Chair
Department of Business Information Systems
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Teaching on TV is *not* the same as teaching in a traditional classroom, and those preparing to teach a class using video-based distance technologies are often intimidated by the thought of appearing on camera. Although most instructors have taken at least one course in public speaking, very few are comfortable with large lecture halls or with televised delivery. Conducting a class in a large lecture hall with hundreds of students and the televised delivery of course materials require many of the same kinds of presentation skills, but these skills are rarely taught in graduate school in spite of the increasing need for college instructors with such skills.

Televised delivery in particular requires skills rarely taught to those who will become college teachers. Regardless of the type of video technology, classes employing video as a medium of instruction require an instructor who is able to address a video camera in a relaxed and natural way. Whether classes are broadcast live by satellite or cable, use CODEC (COmpress/DECompress) technologies, or are prerecorded on videotape distributed to the students, instructors who teach video-based classes—*teleclasses*—need to develop a new set of skills.

## Time, Distance, and Education

Since the days of Plato's Academy, the conception of education has been that students go to locations established for that purpose. Colleges and universities were established as centralized collections of scholars, books, and other educational materials. Education was thought of as synchronous and local, with teacher and student engaged in the process at the same time and in the same place. The vast majority of those teaching today, and especially those teaching at the postsecondary level, are products of that kind of learning environment. Most of us learned to teach by observing our own teachers in a traditional classroom setting and then modeling their behavior.

### TV or Not TV, That Is the Question

Distance learning has evolved along with changes in information technology. The wandering poets of antiquity were gradually replaced by collections of manuscripts in private and church libraries, which were in turn replaced by collections of scholars and books at universities. In the nineteenth century, improved postal services gave rise to correspondence courses. Since their earliest days, radio and television have always included some educational programming, and colleges and universities originally saw TV as an easy way to reduce the costs of traditional education.

As early as the 1950s, classes with large enrollments were frequently taught in more than one room using closed-circuit TV to transmit the lecture between rooms. Some universities still have large lecture halls filled with TV monitors spaced every few feet, ready to convey knowledge to the masses. As TV and audio technologies improved, their educational applications increased in number if not in quality. Broadcast TV and audio- and videotape made it possible to deliver educational programming and materials to very large numbers of people who were not necessarily in the same place at the same time. Colleges and universities were quick to use TV as a way of extending their reach to students who otherwise would find taking classes difficult.

Outside the university setting, people have been purchasing a wide variety of instructional audio- and videotapes for years without recognizing that they were participating in distance education. Self-improvement audio- and videotapes are, in fact, a big business. Exercise videos alone sell by the millions. Many airlines now use prerecorded video—a distance learning technology—to provide passengers with the required preflight safety information. In many ways, we all engage in DL on a regular basis.

Since the early days of correspondence courses advertised on matchbook covers, educators have questioned the quality of DL courses. While some are, of course, better than others, comparisons of educational delivery systems have consistently shown no difference in learning as measured by recall of course concepts. Literally hundreds of studies have been conducted since 1949, and none has revealed a measurable difference in learning between traditional classroom instruction and that delivered by DL technologies. In many cases, students in DL classes outperform those in traditional classes on similar exams.

### Electronic Classrooms

One of the ironies of DL is that even as we are increasingly discovering that traditional classroom instruction is not an especially effective form of educational delivery, we continue to try to use distance technologies to replicate the classroom environment so that we can make learning at a distance more like traditional learning on site. An electronic classroom usually contains seating for the local students, a document camera (mounted vertically above a desk or platform) for recording or broadcasting images of documents, a computer for presentation of graphics, and TV monitors for observation of recorded or broadcast signals. It may also include monitors for showing students and documents from the remote sites.

Remote sites are often seen as extensions of the local site, with technology substituting for face-to-face interaction. Students at the remote sites are required to be present for class in the same way they would be if they were enrolled in a traditional class. Instructors need to learn that the TV camera represents a principal portion of their audience and that looking into the camera establishes "eye contact" with students at the remote locations. When this works well, students at the remote sites feel more as though they are part of the traditional class on campus. When it doesn't work well, however, the technology becomes a barrier to learning.

## Materials, Tools, and Technologies

Modern distance learning is based on a variety of technologies. Because DL instructors and students are separated by time and/or distance, the technologies play an important role in the educational process. In general, DL classes require more and better planning and better use of technology than traditional classes. All forms of communication, from print to video to computer conferencing may be required to ensure high-quality DL classes. The first key to effective video delivery is preparation.

### Prepare

In a traditional class, an instructor may plan the course in general before the semester begins and prepare a syllabus, but the specific lesson plans for any given day may not be prepared until the day the lesson is to be delivered. In DL classes, materials must be planned completely *before* the course begins. How course content is delivered will make a difference in student learning, and video delivery does not provide the same degree of last-minute flexibility available with traditional classroom instruction.

Anything that the students will need to read, for example, should be presented in a printed study guide rather than on a TV screen. Television is an ideal medium for presenting visual images; it is a poor medium for the delivery of text. Because the students will receive the study guide and other materials before the video delivery of the course (or, if prerecorded tape, at the same time), they can be directed read material before the next telecast or, if need be, to review it during a telecast. If the course is prerecorded, they may be directed to stop the tape while they read specific information in the study guide.

The study guide, supplemental course information presented by computer conference or Web pages, and the video delivery need to be coordinated to ensure the students' active participation in the learning process. Planning the details of this coordination *before* the video portion of the class begins is the first step in appearing relaxed and confident on camera.

### Rehearse

From the student's perspective, video-based DL consists primarily of watching television, something with which most of them have a great deal of experience. Commercial television has established the standard for production quality and expected style. When you watch commercial television, note that even programs intended as information delivery (such as the morning and evening newscasts), are designed primarily for passive consumption rather than interactive learning. News anchors, for example, never interrupt the delivery of the news to administer a quiz.

Most college teachers, however, learned their instructional techniques by observing their professors in traditional classrooms, in which some interactivity was ensured by the physical presence of the instructor if not by questions and class discussion. Because television developed as a one-way medium of communication, TV must hold the viewer's attention without his or her active participation in the communication process. Commercial television has developed a number of strategies for doing this, the most important of which is the presentation of a constantly changing visual image. In commercial television, the image changes on the average of once every 10 seconds. In a traditional classroom, and in most video for DL, the image rarely changes: the instructor becomes a *talking head*.

Effective rehearsal for TV delivery includes thinking about ways to make the video image more interesting and developing a plan for incorporating them. Greater use of graphic aids, incorporation of tape shot in different locations (such as interviews with business professionals at work, laboratory experiments, or even tape shot of the same class being taught in a traditional classroom), changing backgrounds or camera angles, adding motion to text shown on screen, and appropriate use of computerized special effects are all worth considering. What you will be able to do will depend on the technology and production support available.

## Education and Entertainment

When I conducted my first video-based DL class by satellite transmission, those in charge of distance education at my university told me not to worry about my presentation skills, that "the students were interested in the course content and that the quality of my delivery was unimportant." This thought may be small comfort to some first-time DL instructors, but I knew that it wasn't true. Today's students have spent too much time watching TV not to be aware of the delivery style of the instructor and the quality of the "show."

### Peter Jennings and Oprah Winfrey

Television newscasters and talk show hosts have set the standard for delivery of information on television. Notice the way the best of them appear relaxed, confident, and authoritative, and notice, too, the way in which they seem to be speaking directly to each individual viewer. Peter Jennings and Oprah Winfrey make it look easy. That's the delivery style to strive for.

For video-based instruction, it is not enough to deliver good content. Effective DL requires that good content be delivered in an interesting way. Rather than use technology to create a poor imitation of the classroom environment, take advantage of video to do things in new and interesting ways.

### Knowing and Doing

Planning thoroughly and knowing exactly what you are doing are the first steps to feeling relaxed and comfortable as the instructor in a teleclass. Spending time rehearsing will also help. Good television delivery is much like effective public speaking for large audiences: Knowing what you want to say is essential, but it is not enough to ensure an effective presentation.

Speaking to a large audience or addressing a television camera is like riding a bicycle or driving a car: You can't think about it and do it at the same time and be effective. If you have to think about how to turn a corner while riding a bike, you are likely to fall in the process. The best cyclists, the best drivers, and the best public speakers turn the actual performance over to their unconscious processes. The same is true for teaching by video. Speaking to the camera needs to become as automatic as riding a bike.

### Left Brain/Right Brain

In recent years, much has been written about the specialization of the left and right hemispheres of the brain, with the left hemisphere concentrating on the cognitive and conscious and the right hemisphere concentrating on the intuitive and unconscious. Effective telecourse teaching requires the full participation of both sides of the brain. Left-brain cognitive mastery of course materials and the technologies employed needs to be coupled with trust in one's intuitive ability to say the right thing at the right time. Most academics have spent a lifetime training their left brains and very little time and energy exploring their right brains. Planning for and delivering a telecourse provides an excellent opportunity for learning to use the whole brain in educational delivery.

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## Autobiographical Sketch

**Joel P. Bowman** received his Ph.D. in English from the University of Illinois in 1974. Currently serving as Chair of Business Information Systems at Western Michigan University, Bowman regularly teaches both Information Systems and Managerial Communication in a variety of delivery formats, including self-instruction (correspondence), large lecture, telecourse, workshop intensives, and prerecorded video. He is the author or co-author of numerous articles and 14 books and workbooks.

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## Collaboration or Competition?
## The Influence of Diversity on Distance Education

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Traditional higher educational settings and professional training centers are changing worldwide. The once handicapped-inaccessible ivy-walled towers in mostly pastoral settings filled with homogeneous classes are rapidly transforming their infrastructures and enriching their student profile demographics. Why?

There are two major reasons: First, the worldwide mobility of populations due to political democratization and transcontinental outreach due to the expanding global marketplace in competitive economics have literally changed the "face" of our student bodies; and second, site-based instructional technologies with the enhancement of assistive technologies and telecommunication networks with satellites in geosynchronous earth orbits are linking students and instructors providing time-shifting and location-shifting of sessions and barrier-free remote classrooms.

Recently, the *New York Times Magazine* (Menand, 1997) published an article describing some societal changes effecting higher education populations. Some amazing highlights include the following facts:

- More than half of our college students are 22 years old or older and almost a quarter are above the age of 30.
- Forty percent of our students are part time.
- In the ten-year period (1984–1994), 2,000,000 more students entered higher education with a mix of 71% African-American, Native American, Asian American and Hispanic American plus 29% were non-resident aliens and white women.
- The total of minority and foreign students equals to 27.8%.

What does this new student profile imply?

Many students who have been in the workforce and not traditionally, new high school graduates, probably need basic skills, test-taking and study "refresher" classes. New experiences for student-centered classrooms, cooperative pedagogic strategies and service learning opportunities, put the onus of learning in the hands of the student rather than in control of a former teacher-centered traditional setting. Furthermore, students must be more self-disciplined and self-directed.

To make matters more kaleidoscopic, many foreign exchange students and newly arrived immigrants are probably Limited English Proficiency (LEP) or English as Second Language students (ESL). Many, for example, from the Asian and former Soviet Union countries are from collectivist societies where "collaborative test-taking skills" were encouraged, rote memorization was synonymous to learning, and teachers were very highly respected and revered as the epicenter of instruction.

With the genesis of the ADA (American Disabilities Act), students with disabilities are now provided greater access and barrier-free environments in which to learn. In fact, the National Council on Disability can be accessed through the University of Minnesota website <http://www.disserv.stu.umn.edu> to explore a myriad of accommodations for every type of disability are listed. In addition, assistive technology can include sensory enhancers, environmental controls and keyboard adaptations (Bragman, 1996) to enhance the learning environment for the disabled student whether in the traditional or non-traditional, high-tech classroom. In other words, even vision-impaired students, for example, can access Internet voice files through a new development called EchoSpeech (Piquot, 1997). Thus, the barriers to traditional education are finally diminishing due to the advent of instructional technology.

So, is there a potential problem with diversity + distance learning?

Yes. When designing a distance learning system for educational delivery, it is essential to look beyond the wires and satellite technical configurations; it is essential to look at the needs of the "regular traditional" student; to take into consideration the diverse backgrounds and diverse needs of a changing student population.

So, it is important to know which questions to ask when designing or modifying a distance education delivery system. Advertisements in magazines and newspapers entice especially the non-traditional student who may have a job or family responsibilities or may be wheelchair bound or may not be able to speak English too confidently. For example, the New York Institute of Technology promoted an on-line program in a Sunday newspaper supplement (The Hartford Courant Spring 1997) called "The Ultimate Guide to Information Technology Employment" encouraging a high-tech educational program by "Animating the Spirit and Empowering the Mind: Let Us Open the Door to Your Future" where you can "take courses at your convenience" and "individual attention and support services"; but how does the student see beyond a well-intentioned (or the nefarious profit-making) marketing-hyped program?

A primary question to ask: Is there a collaborative approach with teacher and students working as teams to succeed in distance learning courses or is there a fierce competition pitting the student against the absent, off-site instructor and necessitating that the student fend for him or herself is a support-less or minimally supportive environment? How is the "human element" integrated within the learning environment?

Thus, the purpose of this workshop presentation is to introduce a continuum of distance learning factors from technical-centered to human-centered for participants to apply to and evaluate their educational settings. In addition, through Internet access, participants will be provided time and sites to "surf the net" for the purpose of revealing how a virtual college tour of their institution compares to other online samplings. Special attention will be made to samples of diversity, disabilities, and distance learning facilities' information.

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## Autobiographical Sketch

**Patricia Ann Brock** is an Associate Adjunct Professor at Raritan Valley Community College in New Jersey and a Visiting Assistant Professor at Pace University in New York City. She is also a Culture and Language Diversity/ Education Consultant with IPS, Somerville, NJ. She has published several articles in the fields of cultural and instructional diversity and is the author of a college textbook entitled Educational Technology in the Classroom (1994, Educational Technology Publications, Inc.) She was the first American Fulbright Scholar to teach at Kyrgyz National University in Bishkek, Kyrgyzstan; a UNESCO/Alexandria University grant recipient to Alexandria, Egypt; and a University of Texas Culture and Language Fellow to Jagiellonian University, Krakow, Poland. Dr. Brock has presented workshops and presentations at conferences in more than 11 countries on four continents. She received her doctorate at Rutgers University in New Jersey and her post-doctoral TESOL certification with Distinction from Trinity College London.

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# Intellectual Property and Copyright Issues: Yours? Mine? Ours?

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How do we create an innovative, supportive environment for distance teaching and learning while attending to copyright and intellectual property concerns?

## Session Objectives

- To present attendees with highlights of intellectual property concerns, including copyright, as specifically applied to faculty and institutions in a changing environment
- To highlight new legal developments affecting distance education for example the proposed CONFU guidelines effective as of May, 1997 (distance learning, digital images, multimedia)
- To present attendees with concerns and issues about faculty rights to intellectual property and institutional concerns and rights and policy issues which need to be addressed
- To explore support issues such as electronic reserves and web sites

The subject of intellectual property, including copyright, is one of importance to individuals involved in all aspects of distance education. This session will set forth intellectual property concerns and issues for faculty and institutions and suggest policy content points. It will highlight new developments in copyright and legislation of interest to distance education designers and faculty. Learner support issues including electronic reserves, web sites, and policy concerns for remote students will be included.

## Topic Area and Importance: Faculty Development, Issues and Policies

- Distance education providers are vulnerable to copyright infringement because of conflicting information and "gray" areas in the current law and interpretations. New guidelines are not particularly helpful nor are they comprehensive.
- Distance education providers need an understanding of how to protect themselves and the organization as well as how to work with copyright owners and faculty concerning intellectual property.
- Distance education providers need awareness of copyright problems and issues when providing learner support to remote students through web sites and electronic reserves.
- Distance education designers must be able to assist colleagues with understanding what is legal, not legal, and gray.

- Intellectual property issues and policies are of concern to both faculty and institutions. The explosion of distance education is bringing many new issues to the forefront which must be considered.

## Autobiographical Sketch

**Dr. Bruwelheide** is a nationally recognized expert and consultant on copyright and intellectual property. She teaches over a distance education network and works with faculty to develop telecourse design and delivery skills. She is also project director for two telecommunications training grants. Janis is the author of *The Copyright Primer*, copublished by the American Library Association and the National Education.

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# Are Disabled Students Caught in Your Web?

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## Introduction

Persons who are print disabled are the "information hungry." This includes the blind, low vision, some learning disability persons and people with motor impairments that prevent their holding a book. Adaptive computer technology now enables them to access information in electronic format. The advent of the information highway holds the promise of filling their needs, and the world wide web is foremost in its role as an information provider. Coupled with distance education programs, such persons can be mainstreamed as never before. However, inadequate html coding and in appropriate use of graphics threatens to put up new barriers to their access of education and information. Besides robbing disabled students of the opportunity to have equal access to education, such barriers contradict the Americans With Disabilities Act and the Vocational Rehabilitation Act leaving a school open to civil rights litigation.

The ability of computers to turn print into an electronic format is an essential foundation for our information age. When text is digitized, it can be displayed in many different ways. These include showing that text on a computer screen, speaking it through a voice synthesizer, displaying it with refreshable braille output and, using large font display on the monitor to facilitate the needs of people whose sight is slipping from age or from some disease condition. Because there are many alternate means to input commands into the computer, users with severe mobility impairments preventing them from holding books can now manipulate text displayed through a computer. While they may not be able to hold a book or turn pages, the computer can navigate through the document for them.

In short, electronic text provides the potential to overcome traditional print disabilities. Actually, print disabilities are the result of the developments of print technologies. Since technology caused the disability, technology now can obliterate that same disability.

## What's the Fly in the Ointment or the Web?

Because the web has been so heavily graphical in its development, and because so many browsers accommodate to that graphical format and because they make such extensive use of the mouse (a device requiring hand and eye coordination) the web is needlessly creating new, artificial barriers for the information hungry and the technology is newly extending the existence of print disabilities.

When a web page uses icons or images, including text in an image format, a browser set to text only or special browsers for the blind do not display that graphic. Instead it displays the word "image." When that graphic is being used as a link to another page, the browser displays the word "link." There are pages which may only display a few text words and then be covered with the words, "image" or "link." This is not very informative. The text browser will locate the location of the link on the page, but the surfer is in the dark as to where it will connect. When bit maps are used as a set of links or table of contents, the text browser usually cannot even locate the link in that map preventing the surfer from accessing further pages.

Frames and tables also present various serious problems for the text browser and disabled user. When a table does display the material visually correct, the blind person is using a screen reader which will read line by line from left to right making nonsense of a table.

Pages that are packed with information and with links will be confusing for the blind, low vision and the learning disabled. The mobility impaired may also have a difficult time maneuvering the mouse or its substitute to a specific item in the overall maze. Pages with heavy wall paper on them or with colors that are close to each other will be problematic for many groups including those with color blindness.

## Four Easy Solutions

First, be a good host or hostess. Your web site invites people, by its very existence, to come and visit you. Provide a welcome for everyone. Think of the possible needs of your guests and do what you can to make them feel at home. Before discussing how to do this, be sure to have a welcoming mind-set. Do not require viewers to use a specific browser and version of that browser if you can avoid it. Otherwise, you are telling other potential guests that they are not wanted and not important.

Second, strive to communicate rather than to show off. Odds are that the more you focus on being flashy that you will communicate less. This rule is not merely to welcome disabled visitors but to help you keep your focus in the right place. Being flashy may catch people's attention, but, if you do not communicate anything of value, they will not linger or return. Here is another place where taking into consideration the needs of the disabled can be to the advantage of everyone.

Third, define the purpose of your web site and use design features that will consistently further your mission. Graphics and text which do not clearly further your goals will distract and confuse. Keeping your mission clear and your pages simple is important. If your purpose is to showcase contemporary paintings, you will require heavy graphics. There would be no good way to make this content genuinely accessible to a blind surfer. If you want to provide audio of musical instruments, there would be no meaningful way to make it useful to a totally deaf internet user. Knowing your mission will shape the design tools you use in creating your pages.

Last, there are a number of design principles and special html tags that will help you create pages that are universally accessible. The most common is the alt-text tag. A browser in text mode will display any text in that tag instead of a picture. Instead of displaying the word "image" it will display the text description of the graphic in that tag. At least the surfer knows what it is that he or she is missing.

Look at your page with different browsers including a text browser. Try different color combinations and note how they impact readability. Take a piece of paper and make a horizontal slot in it big enough only to let you see one line on the monitor. This will partially reproduce the experience of a blind user. Take another piece of paper and make a six inch square hole in it. Look at your page with this on the monitor and move it around to see how difficult it is to make sense of the page.

EASI (Equal Access to Software and Information) which is an affiliate of the American Association for Higher Education has a web site, http://www.rit.edu/~easi, with a wealth of information about making information technology accessible to persons with various disabilities. EASI delivers an on-line workshop on creating accessible web pages, http://www.rit.edu/~easi/workshops.html, for a nominal charge. It also provides pointers to a host of free resources to help create web pages, http://www.rit.edu/~easi/access.html.

## The Law

As educators you will want to provide your resources in forms most usable to all students. You will also want to avoid entanglements with the law as well. The Department of Education's Office for Civil Rights has made a number of findings which indicate that educational materials and instruction must be available in formats for disabled students. This is based both in section 504 of the Rehabilitation Act and in the Americans with Disabilities Act. Some of these findings most relevant to information technology are available at http://www.rit.edu/~easi/law.html.

## Conclusion

Education is empowerment. Modern information technology, when adapted to meet the special needs of persons with disabilities, provides educators with the opportunity to include disabled students into mainstream learning environments. We now can empower the print disabled through digitized texts and through the world wide web. College and university courses are integrating the web into class instruction. Now is the time to help teachers and instructional technology staff avoid erecting needless and harmful barriers preventing disabled students from having equal access to these materials.

## Autobiographical Sketches

**Combs** is a professor of history and has been involved in distance learning for more than a decade. Being a blind professional, he makes extensive use of adaptive technology which led to his becoming the Chair of EASI (Equal Access to Software and Information) and directing a National Science Foundation Grant for EASI, an affiliate of AAHE. Combs is also providing consultation on disability access issues for the Western Governors' University. He has presented on both the topics of disability access and of distance learning across the US and in Canada, England, Switzerland, Hungary, Turkey. Combs co-authored with Carmela Cunningham *Information Access and Adaptive Technology*, Oryx Pres, 1997.

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**Banks** has been an adaptive technology consultant for University of Wisconsin-Stout and has served as a consultant on adaptive technology in Thailand for Ratchasuda College Mahidol University Bangkok. He is EASI's electronic resource manager and responsible for its extensive web pages and responsible for overseeing several of EASI's listserv discussion lists. Banks also assists Combs in teaching an online workshop on adaptive computing which has reached over 500 people in more than 24 countries. They have made frequent presentations at conferences such as AAHE, CAUSE and on many university campuses.

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# See, Jane, See: Communicating Beyond Words

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Distance learning has become the gold rush of the 1990s. Everyone wants to stake a claim. The dream is that if the proper technology is purchased, distance learning programs will automatically evolve simply by transporting traditional courses to a teleclassroom. Instructors have been told to teach as they have always taught that teaching at a distance isn't that different from traditional teaching. This logic concludes, purchase the equipment, save the institution. Nothing could be further from the truth. The field of dreams will not materialize. Teaching at a distance is different from traditional teaching with the need to sharpen some teaching skills and incorporate new teaching skills. Traditional podium-based courses cannot be transported to distance learning without modification. This will result in teaching by appendage (Martin & Samels, 1996, July 14). This is the "talking head," an instructor's face talking at the students over a television set without any type of interaction. This type of communication is from the mouth of the instructor to the ear of the student. Another result is the "shiny ring" or "moving hand" teacher in which a ring-laden hand or hairy arm is writing words and numbers and the student blindly copies what is written on the television screen.

"Interactive" television today is anything but interactive. It is voice-dominant with minimal interaction. The computer conference in its many different forms is primarily word-dominant with a great deal of page turning. These types of telecourses will not survive in a competitive environment over the next few years. Student consumers of distance learning programs have higher expectations. Quality telecourses require that the strengths of and opportunities provided for in the different delivery systems (audio, video, computing, and print) be utilized in the design of telecourses. Interactive television as well as the World Wide Web are visual media that have capabilities to provide synchronous and asynchronous communications for participating students.

Teaching at a distance differs from traditional teaching in a number of ways. There are a number of areas of teaching competence that have been documented in two studies (Cyrs & Smith, 1988, 1990):

- Planning and organizing a telecourse
- Television graphics and visual thinking
- Involving students at field sites and managing their learning activities

- Use of handouts correlated with the television and computer screen. Handouts must be organized and each element numbered for audioconferencing for easy reference.
- Verbal and non-verbal presentation skills, especially for interactive television
- Looking good on interactive television
- Packaging a self-contained telecourse
- Team building and consumer assessment, which will create a high level of sensitivity. Feedback will be more public since personnel other than the instructor and students need data. These people include instructional designers, graphic designers, Web library specialists, and administrators.

These areas of competence translate into a number of reconfiguration guidelines that can be used to modify traditional courses for delivery at a distance with the different technologies, including audioconferencing, interactive television, videotape and audiotape, the World Wide Web, the Internet, and print as handouts and study guides. These reconfiguration guidelines are generic and apply to all of the delivery systems:

- Three times as many visuals in a television format (3 x 4 aspect ratio)
- Short eight- to ten-minute lecturettes
- Verbal and non-verbal communication skills, especially for interactive television
- Student involvement activities at field sites for a large part of a teleclass (30–50 percent)
- Handouts correlated with the television or computer screen
- Synchronous and asynchronous communication for different types of learning using mixed delivery systems
- Different course planning and organizational skills
- Telesyllabus for telecourse detail
- Use of a student handbook to suggest how to take a telecourse

All of these guidelines are important for the design of quality telecourses in each of the delivery technologies with the exception of verbal and non-verbal communication, that applies primarily to interactive television at the present time. When the latter is incorporated into computing as teleputers, these skills will be equally important.

This paper will deal only with the skills of visual thinking as they apply to all of the delivery technologies. Visual thinking is the ability to conceptualize and present ideas, thoughts, and data as pictures and graphics in a variety of forms that replace a great deal of the verbiage used to explain ideas. They are often used as prompts and cues and attention-focusing strategies. This addresses visual indicators, visual analogy, magic illusion, word picture design, storytelling with visuals, and the use of clip art.

When you begin to think visually, look for words that cue you to the possibilities of visualization. These are called visual indicators. A sampling of these indicators include such things as: Motion-people or animals doing something; action-real or exaggerated; colorful descriptions or attributes of something; contrast-color, sound, images; examples; qualifications; exaggerations; size or weight; colors; light and dark; people or animal images; male or female; physical stature; time-past, present, or future; and many others.

Simply stated, an analogy, verbal or visual, compares an unfamiliar thing to another familiar thing. It is an explicit, non-literal comparison of two things that appear to be different but have definite similarities. The basis of the comparisons, the similarities and differences, is explained overtly. Nothing is hidden. Two sets of data, one familiar and one unfamiliar, are related to each other based on their shared attributes, similarities, functions, effects, or circumstances. The purpose of an analogy is to improve thinking skills and help the student to develop new insights by exploring new and different connections and relationships. It can be used with any subject. Analogy is most helpful when the subject is complex, abstract, and totally unfamiliar to the student (Cyrs, 1997). There are five parts to a visual analogy: (1) The subject or unfamiliar concept; (2) the connector that links the subject to the analog; (3) the analog or the familiar concept to the student; (4) the ground or similarities and differences between the subject and analog; and (5) the visualization or way of representing the concept visually. For example, an analogy is, "Red blood cells (subject) are similar to (connector) trucks (analog). The red blood cells deliver oxygen to cells. Trucks deliver products to given destinations (ground)." Using a large dump truck or other type of truck during the teleclass presentation (visualization) reinforces the concept of delivery and provides a stimulating and possibly humorous reinforcer.

Magic illusion is an attention-focusing device that can make the concept interesting. Everyone likes magic. Why not use it to reinforce an *important* idea? A good magic trick is one that can be described in one sentence. You must know exactly what the effect is that you want to create and why it is worth the time to do it. You must also know exactly what it is that you want your students to see and believe. Most importantly you must know how to make a transition statement to a key teaching point. Without this transition, the magic becomes only entertainment. Pick up a children's collection of magic tricks at a toy store and it will change the way you teach.

Word pictures provide the teleinstructor with a strategy to visualize their important ideas without a great deal of effort. A word picture is a graphic representation of concepts, principles, and information represented by geometric shapes, lines, and arrows, derived from various patterns used by faculty to organize a telelecture. Each concept, principles, or piece of information contains *key words or phrases* which are shown in nodes. A node consists of a geometric shape with a key word or phrase. These nodes can show varying levels of reality as well as visuospacial relationships among the ideas and concepts. Relationships are linked to show connections. Relationships are represented with solid lines and arrows with abbreviations added for clarification of the relationships. Equal weight or hierarchical relationships can be shown among relationships by representing the nodes as contiguous or overlapping. The word picture can add information to the geometric shape and connectors with the use of clip art that replaces the word only. For example, if a word picture consisted of a circle with the word apple in it, it could be improved with the graphic or picture of an apple.

Word pictures are not necessarily self-explanatory. They often require supplemental oral information for a full explanation in a telelesson. Word pictures are used to communicate important information by condensing information to its most critical elements in skeleton form through the use of key words that are shown in the nodes. Key words are the most significant words in a written or spoken statement that provide valuable cues and indexes to the content. Many are nouns or verbs, but this depends on the context of the statement. Key words or phrases are often *italicized,* in **bold print,** or underlined in print materials or use some type of verbal cues or handouts in a lecture. Word pictures are used by the instructor in the form of television graphics, on 35mm slides, as television overheads, or as electronic computer graphics. They can also be reduced in size and used as handouts for students to follow during a telelecture. Attention can be focused through the use of word fill-ins within the nodes.

Storytelling is another important strategy to focus attention on an important idea. When the concept or idea is wrapped in a story it is easier to remember. As with magic illusion, it is imperative that there be an obvious transition between the key point that the instructor intends to make and the story told. The teacher who can wrap a key teaching point in a story will motivate students to learn. Storytelling can be enhanced with the use of visual reinforcers such as puppets, hats, clothing, and artifacts. Title your stories and share the title with the audience. If you tell a story about people eating apples, hold an apple and pass some out. If you are telling a story about something in a paper bag, use a paper bag. If you are telling a story about a chicken, use a rubber chicken. Go back to the visual indicators and review the possibilities.

A good practice is to write your stories out in full narrative form and review them for bias, gender sensitivity, or any possible cultural overtones. Ask some colleagues to read your stories and tell you what they think. Reassess and revise the story until it reflects your key teaching point exactly on the mark.

Visual thinking is a powerful strategy to improve instruction at a distance. Since interactive television and the computer are visual technologies, visualize. Let Jane see what you are saying.

A new text by Cyrs (1997) provides hundreds of examples of visualization techniques. Every page includes one to four examples of how the author would visualize the key points on the page. The visualization is simple and inexpensive. It includes clip art, word pictures, anecdotes, and sayings.

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# Teaching Science at a Distance: It's Not as Far as You Think!

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## Introduction

Multimedia in a videoconferencing environment can be a powerful means of teaching complex concepts and procedures. This paper will discuss effective techniques for teaching scientific principles in university and continuing education settings. The workshop associated with this paper will demonstrate a variety of software packages and strategies, including computer simulation, animation, graphics, and virtual field trips that enhance student understanding of complex and abstract scientific content. The workshop will also provide examples of mini-lessons using the World Wide Web, microscopes, and problem-solving teams.

### Can Science Be Taught at a Distance?

Often university faculty and Extension personnel question the effectiveness of teaching or program delivery at a distance. Can distance education reach more people, save time and money, and also provide effective learning experiences for students? Numerous research studies have shown that there is no inherent significant difference in the educational effectiveness of media (Russell, 1996). Students learning at a distance have the potential to learn just as much and as well as students taught traditionally (Schlosser & Anderson, 1994). What *does* make a difference is the detail given to instructional planning and design (Box, 1993; Lacy & Wolcott, 1988; Price & Repman, 1995; Schrum, 1996; Telg, 1996). "Creating lessons and courses for distance learning is not a trivial activity, and it is not merely a matter of applying distance learning technologies to a successful traditional classroom lesson" (Schrum, 1996, p. 31).

### Instructional Design

Instructional design has been defined as "the systematic process of translating principles of learning and instruction into plans for instructional materials and activities" (Smith & Ragan, 1993, p. 2). "The effectiveness of courses delivered over a distance, like face-to-face instruction, depends on the planning of the course, class activities and the instructional materials used. The use of systematic instructional design in course planning can help to make any instruction more successful in promoting learning" (Price & Repman, 1995, p. 251). To set the stage, let's briefly look at three major components in the instructional design process as it relates to distance education in general: 1) needs assessment/course analysis, 2) course design and development and 3) evaluation (Eastmond, 1994).

**Needs assessment.** The analysis of the audience is particularly important when designing instruction to meet the needs of the distant students. How do you best support your distant students if you have never met them face-to-face?

Before the course, send an introductory letter, including an extended syllabus and site coordinator information about who will be responsible for the student's logistical needs (i.e., textbooks, proctoring exams, lab materials, etc.). Also include a student questionnaire to gather information about students' prerequisite skills and experiences, as well as personal interests to help build rapport and personalize instruction. Often students are intimidated by scientific content, and having an indication of interest and level of understanding can help gauge the types of teaching strategies to use for the course. "Assessing needs is not something done once and for all and then forgotten about; it extends over the time of your teaching involvement and will have an observable difference in your effectiveness in instructing (Eastmond, 1994, p. 95).

**Course design and development.** A creative and resourceful instructor will use the needs assessment to design methods, materials, and media for the specific audience and content. In the book, *Distance Education: A Systems View*, Moore and Kearsley (1996, p. 101) provide a list of questions to assist the instructor in course design and development:

- What content should be included or left out?
- What is the best way to sequence and organize the material?
- What are the best media to use to present the material?
- What kind of teaching strategies should be employed?
- How can learning be measured most appropriately?
- What feedback should students receive about their progress?
- What methods should be used to create the materials?

For the teaching of science courses, instructors often find they can not cover as much content as in a traditional class. Some of this has to do with delays in transmission or logistical issues, which can be handled with some pre-planning and good on-site personnel. Also, instead of straight lecture, content should be modularized in shorter segments to vary active and passive strategies, allowing for feedback and interaction. Therefore, science instructors must find alternative means for students to access and synthesize the content. For example, having the lecture notes on PowerPoint® and placed on a class homepage allows students to spend class time for the application of the content, rather than copying notes off an overhead.

**Evaluation.** Several types of evaluation are used to document the teaching and learning process. Formative evaluation provides feedback to improve the process of implementing instruction. Summative evaluation is a final assessment of instruction to identify issues to be corrected in the future course design and development. Evaluation may also be informal, such as student feedback through simple question and answer sessions.

In distance education, we can provide an environment where students can be evaluated through alternative assessment, such as designing a homepage, electronic presentations, research teams using the Internet, a student prepared videotape, or developing an e-mail discussion group (listserv). Often the teaching of science requires the memorization of facts to be regurgitated on exams. Society-ready graduates and life-long learners must be able to apply knowledge and skills to solve problems in an integrated fashion. Why not teach and assess learning in the same way?

### Summary

Many instructional designers believe that designers should be guided by *principles* rather than *procedures*, and that design approaches should be tailored to the needs and constraints of the specific learning situation (Tessmer & Wedman, 1990).

What *is* different in mediated delivery is not the basic instructional design principles, but the differences in the teaching and learning context.

It is acknowledged that one goal or impetus for distance education is to teach more students and to teach more students where they are. And it becomes increasingly apparent that, as part of the teaching/learning process, it is necessary to attend to or accommodate those students or learners, that they become a focus for instructors and instructional designers of distance learning programs. One of the key principles associated with distance education is that it must be interactive and that our students' participation is desirable. Interaction can take many forms, and we must consider ways in which students can become involved or engaged (Dooley, Edmundson & Hobaugh, 1997). The key is to design teaching strategies/lessons that seamlessly combine content, interaction, and student assessment.

### Engaging Teaching Strategies and Visual Tools for Scientific Content

Planning for student or group involvement may include many of the activities that have been used successfully in traditional settings—group projects, brainstorming, study groups, problem-solving teams, role plays, case studies, panels, interviews, debates, peer teaching, or other group activities (Dooley & Greule, 1995; Monson, 1994). The challenge is to creatively re-think those activities for a different setting, teaching science at a distance.

But how do you teach complex and abstract content, such as science, at a distance? [V]erbal, written, and static-diagram explanations of complex processes is woefully inadequate. Using static description, students seem unable to grasp a full understanding of the intricacies of communication between cells, for instance, or of protein-protein interactions" (Nicholls, Merkel, & Cordts, 1996, p. 359). Describing an experiment in words alone is an inadequate substitute for laboratory or hands-on experiences (Harasim, Hiltz, Teles, Turoff, 1996).

But it *can* be done, and oftentimes, done more effectively than in the traditional lecture mode. Among the alternatives that have been successfully used for this problem are computer based simulations, videotapes, home experiment kits, and arrangements to use facilities in the locale of the student" (Harasim, et. al., 1996, p. 190). Dynamic scientific principles can be effectively illustrated at a distance using hands-on experiments on site, observational demonstrations (video, microscopes, etc.) and "videotools" (computer graphics, animation, WWW, etc.). This combination allows students to make connections and "paint a vivid picture of what components are involved, how they interact, and why they are important, giving students a better understanding of what is happening between and within living cells over time and space" (Nicholls, et. al., 1996, p. 359).

### Multimedia and the World Wide Web

Many students have difficulty understanding abstract concepts and dynamic processes. Multimedia is a powerful tool to demonstrate these principles and aid in understanding. "By using a combination of simulations and computer graphics, students can observe the behavior of models and systems in real time, watch occurrences played back faster or slower, see details highlighted or suppressed, and study visualizations of invisible phenomena. Students can tour a plant or visit a lab anywhere in the world and can even watch the operation of a factory that doesn't exist" (Richards, 1997, p. 26).

Animation and simulation can be used to communicate dynamic, complex concepts that cannot be seen or easily understood. Animating molecular reactions with Cinemation© enables the learners to visualize DNA replication and gene expression; graphing population decline of an endangered species by changing environmental parameters using STELLA® allows students to understand the inter-relationships over time at the system level. Both micro and macro processes can be more easily visualized using these learning tools. Seeing movement and color helps to bridge the gap learners often develop during the fragmented instruction of difficult concepts and helps the instructor explain dynamic scientific concepts (Mouzes & Magill, 1995).

In addition, the World Wide Web shows promise for allowing students to *do*, rather than just read about, science by participating in real science activities around the world. The "network science" approach of telecomputing allows students to work on project-oriented teams, problem solving, collecting and analyzing data. Students investigate real and important world problems and share data with others using telecommunications (Lenk, 1992). Students can also interact with scientists all over the world via e-mail or videoconferencing, bringing the creation of scientific knowledge to life!

### Microscopic Sciences and Virtual Field Experiences

Teaching microscope-based sciences has always been a challenge. Once the instructor located the perfect specimen in the ocular and eager eyes peered in . . . then . . . it's gone! With the emergence of video cameras that can be interfaced with microscopes, all eyes can see exactly what the instructor is trying to show. By using a trinocular microscope equipped with a video camera, the video signal of microscopic images can be collected on videotape. This video signal may also be disseminated through the document camera as an auxiliary video feed to distance sites.

For the teaching of global issues, it's hard to replace a field trip. Students located at varying sites could meet at an on-site location and share some face-to-face time with the instructor and other students. This is often done and recommended, if time and resources permit. But you can also use virtual fields trips—video footage of processing plants, nature centers, field crops, etc. Videos can often bring field experiences to the students, giving them opportunities to gain valuable content that may not be available otherwise. Sometimes students can produce and share these as a part of their class activities and assessment.

## Conclusions

Dillon and Walsh (1992) suggest that teaching at a distance requires different skills and behaviors of instructors. Faculties need to learn how to make the best use of the technologies available in order to personalize their instruction and actively involve students in the learning experience. Taking a traditional course and modifying it for the distance education environment requires significant amounts of time, which is often overlooked by higher education institutions. There are many considerations for effective instructional delivery: systematic instructional design, effective teaching techniques, building interaction, assessing learning, etc. The charge is to design instructional goals and activities that will be meaningful to a variety of students at different locations. Faculty who teach at a distance must spend more time in planning and preparation for delivery. Typical transparencies and chalk-board techniques must be modified into computer graphics; access to resources such as library references, textbooks, laboratories or computer facilities must be considered. Remembering the importance of sound instructional design principles and packaging it all with the elements of effective distance education instruction make for a successful teaching and learning experience, even if you are teaching science!

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# Collaborative Efforts in Higher Education: Improving Distance Learning in Interactive Satellite Teleconferences

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## Introduction

Collaboratively putting together a teleconference which results in an effective distance learning experience is like two people planning to build a house. Each has his or her own ideas, needs, and requirements. Each has individual style and standards of quality, There may be time constraints or financial limitations, but there is also an excited sense of anticipation and accomplishment. Regardless of each person's differences, there should be the united desire to wholeheartedly ensue a joint achievement—the purpose of true collaboration.

Collaboration offers an opportunity for those involved to take a visionary approach to defining common interests and ensuing common goals and purpose. It is not an easy endeavor, as it usually always incorporates change and attempts to overcome organizational or political barriers. Duning, Van Kekrix, and Saborowski (1993) suggested that support for such change must spread across the organizations, and is more easily accomplished with introducing variations within already existing efforts (pp. 53–54).

## Why Collaborate?

Such collaboration takes place at The University of Georgia, where the Distance Learning Link and the Center for Continuing Education work together on interactive satellite teleconferences. The Distance Learning Link is a distance education unit of the Learning Disabilities Center. As a pilot project fostered under the Office of Academic Affairs, the Distance Learning Link works together with both public and private sectors in planning distance learning projects on issues for adolescents and adults with special needs. The Center for Continuing Education was established 40 years ago at The University of Georgia by the W.K. Kellogg Foundation as the second of ten centers, designed as a continuing education program based on organized learning experiences. Funded presently by the State of Georgia and Kellogg grants, the Center and its Communication Services Division provide state-of-the-art broadcasting facilities and award-winning professionals for the production of distance learning projects.

These two units at The University of Georgia have a lot to offer in a collaborative effort to make a special product. Merging expertise on subject matter content and technical production complements the process.

Each of these organizations within the university adds details to make the teleconferences unique, while answering special needs. The Distance Learning Link fulfills requests for alternative media when appropriate for individuals with special needs. Often the individual with special needs benefits from the distance learning experience, receiving hard-to-access material in an easy-to-access way (Gay, 1996). Participant materials have been reproduced in large print and Braille format, Audio tapes have also been provided, along with real-time or closed captioning of many of the teleconferences.

The Center for Continuing Education provides educational programming for both organizations and adults in an environment designed specifically for learning. This means a large number of conference rooms, dining facilities, technical support labs, library, broadcast studio facility, and an instructional studio/classroom for networked two-way compressed video capabilities.

### Where Does Collaboration Begin?

Forty years ago, education on public TV was initiated by broadcasting facilities which chose the very best subject matter experts to instruct courses. Materials were sent to viewers in advance so as to allow for preparation before the airing of the course. That's how teleconferences are conducted today, and it still requires collaboration to be effective.

Collaboration begins with a solid foundation. This is established by developing a quality design, with practical financial strategies. It should consist of generating satisfactory materials and choosing competent personnel to utilize these materials. It takes time, energy, and focus. It takes a team.

### What Are the Roles?

Like building a house, it takes a whole team of professionals to plan and produce a good product, with each individual bringing his or her own skills to the project while incorporating these same skills into the total framework.

The Distance Learning Link, as the producer, has the responsibilities for the content and presentation of the teleconferences. This involves writing scripts, coordinating speakers, arranging downlink sites, disseminating materials and alternative media. To further collaboration, the Center for Continuing Education, as director, makes suggestions to facilitate the presentation of the content. The director must also work with the speakers who use teleprompters, on-screen graphics, and voice-overs. The Center may also work with downlink sites on satellite signal reception.

The Center is also responsible for preproduction preparation. It produces graphics and video clips and makes arrangement for alternative media, such as telecommunication device for the deaf (TDD) and captioning. The Distance Learning Link offers its collaboration by selecting graphics and writing video scripts. Its staff submits a transcript for captioning and maintains the TDD during the production.

### Conclusion

Collaborative efforts require looking at the entire teleconference process by obtaining: instructional objectives, quality presenter performance, excellent video production, adequate number of distant sites, sufficient production of revenue, and satisfactory evaluation of participants.

When achieved, there is a feeling of gratification on the completion of the design and development process. It is a product of team effort, made up of individuals doing their part to create something that can be used and shared with others. The countdown to air time is like the beginning of an open house . . . allowing others to see the creative culmination of collaborative endeavors.

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# 12 ACRONYMS for Successful VideoConferencing or Distance Education Presentations

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## Introduction

Any discussion about technology and the people who utilize it is difficult since both are constantly changing and the symbiotic relationships will always be in flux. Though the very nature and intent of lifelong learning forces us to constantly learn and adapt, the necessary condition for successful videoconferences or presentations require that human beings achieve or at least attempt **ABC** which simply means to **A**lways **B**e in **C**ontrol. As the man from Nissan says, "Life's a journey, enjoy the ride!"

As we race along the Super Information Highway in a high speed dash toward that famous bridge to the 21st Century, perhaps it would be appropriate to pull over at an intellectual rest stop. We may realize that we are not actually driving that super information highway but are being herded in a rush hour stampede of consumption.

There is a current feeding frenzy at the trough of technology which produces long lines of people selling "stuff" and causes anxiety attacks among non-buyers or users who believe they might become rush hour road kill if they don't acquire the latest hot off the assembly line technological wonder unit. It seems a perfect time to reflectively realize that all this wondrous technology is nothing but junk without human beings to utilize it in a creative instructive manner and that all these eager smiling sellers will disappear leaving the buyer to stand in terror and awe and ask, now what?

Technology is vital. It should not and will not vanish, *but technology is useless without creative human beings who can utilize it for constructive purposes.*

The following acronyms are intended as convenient devices to assist you in preparing yourself and technology for your next videoconference, presentation or distance teaching class. Have some fun with them. Rename them, ignore those that are not applicable, and *stop* being impressed with salespeople and their limitless supply of technological "stuff." You, the messenger and your message are more important than the latest digital whiz bang gizmo that does something, somehow, somewhere for some reason.

## Acronyms

**WIT** What Is the Topic?
If you don't know or can't focus on one topic, cover it well and in depth or articulate it in one sentence, rethink your presentation. You may be wasting everyone's time. Do you have a topic that needs to use the medium of television to share it with people? Does it have a title that grabs the immediate attention of the viewer? Above all, don't try to do all things in one presentation.

**TIA** This Is the Audience
Who are those individuals out there in TV land staring at you and why should they

care about anything you have to say? Because if they pay attention, *you* will change their life in some way. Can you give them something they didn't have before you came on camera. You should be very specific about your audience's needs and their demographics. This will help you focus your presentation and resist the temptation to fill their audio/visual plate with more than is mentally digestible.

WAS Where Are the Sites?

Parents are often asked, "Do you know where your children are?" Teleconference presenters need to ask the same question, "Where are the people?" If you don't know, find out. In addition, consider the following location questions:

- ❖ How many locations and where are they
- ❖ Will there be facilitators (there should be)
- ❖ Will there be handouts (there should be)
- ❖ Will there be phones (if you need interactive communication)
- ❖ A fax number
- ❖ Internet address
- ❖ Participant evaluation

All of the above questions need your early attention and input. Do not ignore WAS, because you risk failing your TIA and that eliminates any need for your WIT.

PAPS Pick A Presentation Style

How do you or your group want to present your WIT? You have several options. Like bargain outfits from K-Mart, you can mix and match, but the result may be confusing or ugly. It's best to pick one style and remain consistent and clear.

There is no rule that says, "This is better than that." Although, using a variety of presenters can enhance a long teleconference, for a simple one hour presentation, multiple presenters might confuse the topic. Remember, people aren't the only ingredient in the style recipe. Consider the following formats:

- ❖ **Talking head.** Nothing wrong with this popular style. Most TV is nothing but talking heads (local and national news included). The question is and should be: Does the head have anything (content) to say? If it does, great, use this style. Most distance teaching is done this way and is anecdotally effective;

- ❖ **The panel.** This "safety in numbers" style puts several talking heads on one platform simultaneously. The advantage to this approach is at least there is visual as well as vocal variety and life experiences which can add variety to the presentation. If this approach is contemplated, be specific in assigning topics to avoid repetition. For example, if panelist A addresses green, don't let Panelist B also address it (at least not until the Q & A section);

- ❖ **The star or expert** is becoming an societal favorite. Keep in mind Mark Twain's definition of an expert: "Some guy from out of town." If you use them, be sure that you are going to get $omething $pecial for your money. The expert or star can pump life, energy, and expectations into a teleconference or presentation. However, it can also create a feeling of ho-hum for the remaining portion of the presentation. Use the expert or star as a high level of expectation to which all elements of your presentation aspire, not as a set of coat tails to ride on. An expert can be worth your investment not only in time, but also in your learning process.

**DAM** **Details Are Mandatory**
We frequently hear "Don't sweat the small stuff." Forget it. Please, sweat the small stuff. Success depends on taking care of details. Just like Santa, make your lists and check them (at least) twice.

All announcements, flyers, and Public Service Announcements (PSAs) must include: Day, Date, Time, Length, Location, Guests, Topic. Instead of long paragraphs, use:

- Bullets
- Facts
- Complete drop dead accuracy

Why should anyone tune-in to watch or participate? How will it impact/change their job, career, life, money, mind, etc.

Make sure that everything is proofed and proofed again. Keep everyone in the information loop. Anticipate deadlines and build in "flab" because you may be the only one that sees timelines as a crisis or necessity. Trick, cajole, lie or cheat, but stay ahead of the timeline curve.

The same "Sweatin' to the Details" applies to using technology. Find someone you trust with your electronic life and *listen to them.* You may have the Ph.D., but they have the AC adapter. Guess which one is going to be more important at showtime?

Technology is intended to play a supporting role, however, don't ever treat it as minor. It is your delivery system. Without it, your valuable content stays in *your* head and no one else's. These "tech" people and creative critters get very excited about tech toys. Let them join the adventure and they will teach as well as help you archive blissful presentational teleconferencing success. There is a major difference between a person wanting to sell you technology and a creative individual willing to use it with and for you.

**TOP** **Toys Of Presentation**
Ah, the good old days when an overhead projector, a flip chart, a handful of magic markers and a roomful of people were enough. It all was so simple then. It still is, only now you've got more toys to play with and to communicate your message.

Would you visit your dentist if he didn't upgrade his technique and equipment? You should upgrade yours as well. Use this technology: computers, DocuCam, smart boards, models, LCD Panels, laptops, DLP, props, roll-ins, roll play, costumes, internet, and even dry erase boards and flip charts. Your toy box of presentational technology is full and getting fuller. Lifelong Learning isn't just for kids.

What tools should you use? Just pick something, anything and use them. Risk, fail, risk again. Using technology is the only way to get used to it. Simply listening to or reading about it isn't enough. You didn't know how to drive a car at some point, but now you do it without even thinking about it. Likewise, you can learn technology or at the very least learn what it can do and what it can add to your teleconference/presentation. Insist that the tech types explain its function to you in comprehensible language. They love jargon (as in any profession), but persist until you understand what it (the specific techtoy) does for you. The operative overriding word is *for you* and *your presentation.* Be selfish. Be very selfish, but (and this is important), be committed to using technology.

We live in a toy driven society so take advantage of it. He or she who has the most toys has the most options.

### WAY Who Are You

Should you be on television? Of course you should, everyone is. The real issue is how do you want to appear to those who are going to *listen* and *watch you.*

Perhaps of all the acronyms, this is the one you have the most individual control over. The WAY you look and the WAY you sound. You are the focus (messenger) from which the content (message) emanates. There have been thousands of books, articles, and entire courses built around creating the on-camera person. Beg, borrow, buy or steal books on the subject. Read them. Believe them. Do what they say.

Don't make the mistake of thinking it doesn't matter. You are wrong, dead wrong. *It does matter.* Television is a visual medium. Almost anything goes. One of your best teachers can be your own TV set. Turn off the sound and watch. Note what appeals, what repulses, what interests, etc.

There are a few, but decreasing number of no-no's on television:

- Black
- White
- Herringbone
- Sunglasses or tinted lenses (cool on rappers, ridiculous on presenters)

If you're asking yourself that tired old question, "does the camera have a thin lens?" No, it doesn't. If you're overweight, either diet or deal with it. Remember Roseanne: It isn't about bulk, it's about power, personality and practice.

Presenting on television is not rocket science. Use your common sense. Think objectively . Get excited and personable about your topic. Treat the camera like your best friend, smile, be warm and fuzzy. If you like the lens, the lens will like you.

Do you like your voice? Most people don't. If not, then change it.

- Slow down/speed up
- Lower the pitch
- Vary the rate/pace
- Modulate the volume
- Use dramatic pauses

All of these tools are available if you make the effort and the decision to use them. Vocal coaches are also available if you have the time, but this is not about performing Shakespeare. It is about being vocally alive and interesting. A cheap tape recorder and real commitment from you can also produce amazing results.

Once you look and sound great, attack the physical.

- No fidgeting
- No shuffling
- No shifty eyes
- No slouching
- No rigid frozen deer in the headlight stature
- No yawning
- Round shoulders
- Don't look bored

You are a human being, so be human: alive, enthused and eager to share what you care about You do care about your WIT, don't you?

Carve this over you mind's doorway: *"If you are not interested and passionate about your message, why should anybody else give a damn?"*

**WAMI** What Are My Images?
Besides yourself (yes, you are an image), any presentation will utilize images. Hopefully, many images. It is a visual medium, but there are some potholes to avoid on the image highway. For example, why do some presenters still consider overhead projectors state of the art technology? Why do some design their computer screens as if they were using an overhead projector? Instead of using images, some presenters put their entire speech on the screen as though it were a TelePrompTer offering the audience the opportunity to read along with them (a.k.a. *follow the bouncing ball*). If you want them to read your presentation, simply hand out pamphlets and let everyone go home.

A few simple, but effective image guidelines to keep in mind when you design:

**Shape**

- Start with a very basic item: Don't use verticals. The format is *horizontal.*
- Design your images for use on a television or computer screen. 3 x 4 format.
- Two verticals. A split-screen effect is possible.

### Text

- Readability of presentation: Try this guideline—All text should be legible to a viewer at a distance of 10 x the height of *any* display screen.
- Verbiage: Phrases. Not sentences. A timely quote, "Liberty or death . . ." is effective as a full screen.
- Jargon: Don't use it. If you do, have the decency/courtesy to explain. Think *inform* not *impress* your audience.
- Concise: Get to the point. Don't kill a picture with words. A picture creates hundreds of words in the viewer's mind on its own.
- Eliminate as much punctuation as possible. It clutters the screen.

### Fonts

- *Less is more.* No more than two type faces on a single screen. No more than three sizes of text on a screen. Titles should be large, phrases smaller. Remember: don't use complete sentences. Be consistent in style and size throughout the presentation.
- Your *font selection* should leave the viewer impressed with content not in awe of your use of letters.
- *Font style.* Sans serif especially for bulleted phrases. Serif fonts are harder to read, but could be used for titles or headings.
- *Spell check.* Don't rely solely on it. Get a dictionary and about three other sets of eyes to proof your screen. Let others review it, you may have missed a typo.

### Contrast/Clarity

The text must stand out from the background.

- Cool colors for the background (blues and grays).
- Warm colors for the text (yellow, gold).
- Use a drop shadow and border around your text to add dimension and separation.

### Images

Always ask yourself the following questions when preparing your images:

- What is the point?
- What can be eliminated?
- Is this the strongest way to illustrate the point?
- What should be highlighted or emphasized?
- How can I relate statistics for impact and effect?
- How can it be simplified?

If you do use statistics, keep them strong, simple and always explain what they mean to the viewer.

### Forms

If you use text with an image, don't explain it with more text. Let the image challenge the audience's mind. Images may consist of:

- Charts
- Graphs
- Clip Art
- Cartoons
- Tables/Maps

- Symbols
- Words

Whatever forms you choose, be sure that the image is relevant; reinforcing and clarifying the content.

**Variety**
Don't repeat images. Two pie charts in a row is overkill. Variety is the spice of interest. Don't become predictable.

**Time**
Leave your image on screen long enough for the audience to think about it and relate to it. In spite of our shrinking attention span, you don't have to MTV your way through a presentation. You, the presenter, are more interesting. Your image should be the strongest, most alive image in the presentation.

BUC Budget yoU Control
Technology costs money and if you don't have any you will be *limited but not eliminated*. The best way to approach the budget aspect is to realize that the production process can be broken down into the following parts:

- Pre-production
- Production
- Post-production

**Pre-production**
While all three are critical, creative and interdependent, the BUC starts here! Because talk is cheap, brainstorming, pad and pencil time, making decisions on paper, and storyboarding will save time and money and eliminate some frustration. Think of this as selecting your wardrobe the night *before* an important meeting.

**Production**
The execution of your pre-production decisions, either live or recorded. Any problems here will not be yours alone. They should be mainly technical (lights, sound, etc.) Let the techs deal with them. You stay focused on your content and presentation style. However, it is always prudent, professional, and profound to be flexible. The production phase will be a nightmare if you eliminate or ignore the pre-production planning.

**Post-production**
This may entail editing to generate a marketable or reusable product, but it should always be used as an assessment, evaluation, de-briefing opportunity.

- What was effective?
- What was boring?
- What needs to be added?
- Where can time and money be better applied?

The ever popular clichés such as "Bang for the Buck," "Bottom Line," "Will it play in Des Moines?" and the ultimate viewer critique, "and your point is . . .?" ask what we are getting for our money and time. The point of BUC is that technology is not cheap, but neither is your time nor your audience's. Time should be treated as a valuable commodity. If you try to circumvent the three-step process, remember the commercial slogan, "Pay me now or pay me later."

**WIMP** What Is the Marketing Plan?
Having prepared yourself, your content, and your technology for your presentation or production, what is left? Marketing in education sometimes causes a tightening or clenching of body parts, but if no one knows about your product, or wants it, or feels they *need* it, you have wasted your time.

There are marketing experts for every phase and function of our daily living. As a society we wear, drink, ingest and exist to consume tons of everything. Teleconferencing and distance education can and should market everything they do. We're a valuable commodity.

Your presentation can benefit from utilizing a few simple guidelines in promoting their products for the mind.

- **Appeal to the heart and the head.** A presentation should have an emotional, personal appeal as well as a practical reason.
- **Break the mold or pattern.** Be unique, flamboyant, exciting, unpredictable, dangerous. It's a busy world, you need attention.
- **Highlight your strongest feature.** Don't try to be all things to all people, be specific, direct, single-minded, focus and do one thing well.
- **Generate trust** in you, your content and its direct value to the audience. Keep it simple and accessible to your audience/market.
- **Create a personality** for yourself as a presenter and for your content as product. Both should establish awareness, familiarity, consistency and acceptance. *Like* the messenger and *love* the message.

We are not talking about cross commercial exploitation, but it takes time, money, effort, and an ability to create. That investment should at the very least be rewarded with an interested audience. As a presenter/teacher you should want thousands to assimilate your product.

**PEST** Strive for the following in all your presentations:

**P** **Practice your presentation.** You want to be comfortable enough to deal with the unexplained or unexpected. Be personable. Everyone responds more positively to someone who is truly viewer friendly. Bring your passion with you and share it.

**E** **Enjoyment, Enthusiasm, Energy** and imagination should radiate from you about your subject to your audience.

**S** **Sincere, Simple, Short** and then **Stop.**

**T** **Theater**. Treat the technology as an opportunity for Theatrical opportunity, not terror. Use tools of the trade. Tinker with Technology.

## Conclusion

It may be approaching the time when this misplaced worship of cutting edge, state of the art technology needs to stop. A time when this "stuff" is removed from deity status and relegated to its proper function.

Once we place technology in its proper subservient place we can proceed to the fun part of playing with it and using it as a toy and a tool. Another word of caution: Despite all you read, hear or see about people and technology, *there are no experts* including this writer. The final decision and verdict belongs to the individual pragmatically dealing with the immediate project.

A word of positive encouragement regarding technology: Keep in mind those famous slogans that should be our mantras: *No Fear* and *Just Do It*. The unassailable truth is that the most effective communication tools are, and always will be, the creativity and imagination of the individual.

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## Autobiographical Sketch

**Richard A. Harrison** is Production/Program Supervisor for Instructional Television at the San Diego County Office of Education. In addition to producing many international award winning programs for ITV targeting audience ranging from K-12 to college telecourses to community education, Mr. Harrison also teaches Theatre and Mass Communication as a professor at California State University, San Bernardino. He holds an MFA in Directing from Yale University.

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# Designing and Developing Courses for Internet and World Wide Web Delivery

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Colleges and universities are developing their ability to utilize educational technology at an increasing rate. This is due in large part to the increase of non-traditional students who are seeking educational resources that they deem the most credible, economical and accessible. The non-traditional student is redefining education in Missouri—barriers of time, space and curriculum are being addressed to meet the needs of a full-time workforce, the demands of adult learners and the realities of lifelong learning to one's economic survival.

The first University of Missouri (MU) distance education courses totally, using the World Wide Web (WWW) and Internet, were offered in the summer of 1996 with a pilot program of five courses. In September 1996 the College of Engineering offered the first two in a planned series of graduate level courses. In January 1997, one more opened and a three additional courses are scheduled for September 1997 and January 1998. A second Engineering program of courses is planned to begin January 1998. The College of Education has two courses available for enrollment over the WWW, and a third course is being developed. The MU Fire and Rescue Training Institute is currently investigating noncredit course development. Other MU units are also in the planning stage for programs of courses, which could lead to a certificate or a degree.

This presentation provides information about the MU Distance Learning Design Center's (DLDC) experiences in designing courses for electronic delivery to distant learners. These experiences included preparing for interaction and collaboration for course design, development, and delivery; designing and utilizing the technology; identifying management and administrative issues; and meeting the challenges of creating a technical interface.

## Interaction and Collaboration

### Team Involvement

Collaboration is defined as the process of reaching goals as a group that cannot be achieved efficiently or effectively by acting singly (Bruner, 1991). We found that investments in interaction and collaborative efforts throughout the course design, development, and delivery stages produced several benefits for the different partners. These benefits included better course design and technology interface; a broader exchange of new information; greater coordination of services from different programs; and combined funds for shared goals. The collaborative team involved key players for project success—administrators, faculty, the instructional designer, the technology specialist, programmers, the server administrator, video production specialists, graphics assistants, and students. Frequent communication for the sharing of ideas, plans, disagreements, and consensus was accomplished through many face-to-face meetings, individual and conference calls, e-mail and computer conferencing, and letters. Other important collaboration guidelines included *sharing* the vision; risk; ownership; decision-making; and time it took for building trust, respect, and accomplishing goals (Melaville & Blank, 1991).

### The Learning Environment

One of the shared team goals was to design and create a learning environment that balanced the requirements of the instructional content with the instructor's teaching style, the parameters of the delivery media, the needs of students, and the limitations of the program sponsoring the course. Faculty and the instructional designer focused on planning the presentation of course content. A systematic presentation of foundational material was created for the WWW (the primary delivery method). Attention was given to the content's organization and clarity, to student preparation and learner differences, and to the logical sequence of the instruction. While faculty provided guidelines for the course's "critical path," they also were able to take advantage of the WWW's strength of hyperlinking. Breaking from the traditional, linear presentation of material, faculty created branching webs that allowed students to assume more control and responsibility for their learning. These webs of hyperlinks were used to accomplish different instructional goals:

- Layering of knowledge by linking additional screens of information in the form of print, audio, video, or graphics
- Reflecting underlying relationships within the course content
- Linking to other WWW sites with relevant informational content

Using these links helped students to pursue a topic for review, clarify relationships, or delve into more detailed background information.

The selection of delivery methods for content presentation and interaction also had to take into account if the instruction needed to be visual or verbal, if it revolved around information that changed rapidly, or if there was a need for hands-on experiences. Therefore, secondary delivery methods (i.e., print materials, lab kits, videotape, and computer conferencing) were sometimes added to support the WWW material. This often provided greater content relevance; efficient explanations of more visual, auditory, or kinesthetic topics and procedures; clarification of content usefulness; and relationships of new information to prior knowledge.

The design and development of an effective and efficient technical interface for the WWW courses was another team goal. Navigation needed to be intuitive for learners and the technical instructions had to make sense. Additionally, the sponsoring programs, as well as faculty, developed a logical process for effective course management and student-support-services. Information was then incorporated into the design so guidelines would be readily accessible, easy to understand, and logical. The many different varieties of hardware and software access issues presented unique problems for several students. However, hardware and software information regarding how to establish working connections, as well as individual help, was made available to students.

A third team goal was the design and development of appropriate and effective interaction opportunities within the course. Interaction with the content might include questions (with hyperlinked solutions) interspersed among the WWW instruction. However, interaction most frequently took the form of computer conferencing that utilized e-mail and chat experiences. Other methods of interaction included telephone calls and faxing. Faculty planned scheduled "office hours" for part of the interaction opportunities. Additionally, some faculty planned special presentations, such as guest lecturers, during those scheduled interaction sessions.

Besides promoting student-to-teacher interaction, methods were also designed to encourage student-to-student interaction. This was frequently done by establishing a relationship between the interaction and the WWW "foundational" content. Faculty were encouraged to structure student interaction around higher order thinking skills that required synthesis, application, problem-solving, and/or creation of new information. Student interaction responses occurred either individually or in cooperative work groups. Faculty could use such techniques as case studies, open-ended "challenges," problem-solving groups, or expert presentation groups.

### Working With Faculty

Faculty, as content experts, and the instructional designer were perhaps the most long-term members of the WWW course development team. Their collaborative work usually included the following process:

- Identification of the primary and secondary delivery media
- Assessment of faculty familiarity with the technologies
- Orientation to the unique issues affecting distance education and distant students
- Provision of supporting course development materials for faculty use
- As needed, coaching faculty in the use of the delivery media
- Assistance with methods for adapting current teaching materials and strategies
- As needed, coaching faculty in the adoption, creation, and use of new teaching strategies
- Assistance in understanding the language, culture, and requirements of other team members (i.e., producers, artists, programmers)
- Provision for on-going support for faculty during the development and delivery stages

The distance education instructional designer often acted as a consultant for the faculty, providing information about cognitive learning, instructional design, the capabilities of the delivery media, and methods for balancing the needs of other team members. Faculty satisfaction was greatly influenced, however, by consultation process skills, personal characteristics, interpersonal skills, and the ability to demonstrate professional respect. While always important, these human factors took on even greater significance as faculty encountered frustrations or student concerns with the technology.

## Designing and Utilizing the Technology

Preparing to offer courses, which are solely internet-based, required us to enter totally new ground. There were a variety of issues and questions which we had to contend with. The following reflect just a few:

- Where is the intended student audience, and what is the nature of the computing environment they will be using to take the classes?
- What are the computer and internet-related skills of the students?
- What are the computer and internet-related skills of the instructors?
- What sort of connections will the students be using to access the course (14.4 dial-up, 28.8 dial-up, ISDN, cable modem, T1, etc.)?
- Do we want to establish minimum hardware requirements?
- What sort of visual design do we want the pages to have?
- From a pedagogical standpoint—how do we want students to be able to navigate through the course?

Our first challenge was to develop an overall strategy or process that would assist us in the step by step design and development of the courses. After coming up with answers to core issues, we established a set of standards. These standards provided us with a framework for developing a course template, within which we could place the course content and materials.

### WWW Course Standards

As we entered into the research stage for the development of our standards, we looked at literally hundreds of sites on the WWW that faculty in various disciplines, from other colleges and universities, had created to augment their face-to-face courses. Many of the sites we looked at contained course syllabi, notes, readings, hyperlinks, course schedules, graphics, etc. We noted the features and designs of each that we liked, as well as those we didn't particularly care for. In addition, we looked at several on-line style guides, Web publishing books, and various conference publications and notes for ideas. We also consulted with our campus's computing unit and with several faculty members on our campus to make sure that the standards we wanted to recommend, and the template design we were envisioning, were technically feasible, usable, and easy to navigate.

The list of standards we compiled includes information on page design; use of graphics; navigation guidelines; quality issues; specific sections that should appear in every course; course schedule; and so on. As computer and internet technologies change, these standards will obviously have to change as well.

Another standard we set was that of including a tutorial for every course. We knew that participating in WWW-based courses would require that students be more responsible for self-learning. Instructors in this environment interact and facilitate rather than lecture. We were concerned that the student-centered, rather than instructor-centered, nature of the WWW environment might confuse technically inexperienced students. For some, particularly first time users, this could have a significant effect on their performance. We believed that it would be imperative for students to possess the necessary computer skills to complete the course successfully before they proceeded to the actual course material. We felt the skills that they needed should include a basic knowledge of the WWW; how to use hyperlinks, search engines, FTP, and Telnet; how to access newsgroups, read and send e-mail messages to individuals as well as to discussion lists, and utilize any software specific to the course. We designed a *Before You Begin* "pre-lesson" which would serve as the tutorial. By completing this tutorial, students demonstrated to their instructors that they possessed the computing skills necessary for successful course completion.

### Communication Tools

An extremely important element of any internet course is the means by which asynchronous and/or synchronous communication takes place between the instructor and the student and among the students. The choice of synchronous and asynchronous tools obviously will be determined by such things as the educational need, the technology available, cost, maintenance and staffing required. Asynchronous communication tools may include e-mail, discussion lists, and Usenet groups. Synchronous tools may include chats, MOOS, MUDS, CuSee-Me, and desktop video. White-boarding tools also allow instructors to simultaneously send text, images and voice data over the Internet to multiple students at a time. Each of these tools has their own particular set of strengths and weaknesses.

The courses we designed with the MU College of Engineering utilized the group conferencing system FirstClass as a communications tool. FirstClass is an easy-to-use multi-platform computer conferencing product. It can be accessed remotely, allowing users to communicate both synchronously and asynchronously. FirstClass incorporates such features as electronic mail, workgroup conferencing for real-time electronic discussions, filesharing , collaboration, and threaded discussions. It has proven to be a very useful and effective communication tool for those courses.

### Technical Support

We found that technical support services for Internet courses was an area that required unique solutions and responses. There are support service issues that are unique to faculty, and support service issues that are unique to students. Some of the support services we found that faculty require included:

- Training in how to use the Internet and how to properly use and manage associated communication tools such as discussion lists and specialized conferencing and graphics software
- HTML training to be able to maintain the course pages once they were created
- Secretarial support for creating electronic files of course content and materials

- Graphics support for scanning, design and production of illustrations, photographs, charts, graphs, equations, etc.

### Student Support

Students also needed to be able to access support services in the same way that they accessed their instruction—on-line. Some of the support services we found that students require included:

- The ability to register on-line
- Assistance with establishment of campus computer accounts
- The ability to access electronic library holdings and electronic databases
- Access to on-line writing lab assistance
- Help with utilizing course-specific software

Many of these student support issues not only impact the design of the on-line technical interface, but they also have broad implications for administrators of the sponsoring programs. Collaboration on these as well as other management and administrative issues often had a ripple effect upon the work of other team members.

## Management and Administrative Issues

Administrators and faculty, when they decide to offer a course for WWW delivery, choose that mode because they want to reach potential students who can not come to campus for a regularly scheduled class. They wish the course materials to be available anywhere a student can connect a computer to the Internet. Frequently it is preferable to arrange the course so students are able to work on the courses and communicate with the instructor, or with other students, at times convenient to them rather than on a fixed schedule of classes.

### Preliminary Questions

In preparation for setting up the design and development team, as well as the preliminary budget, we asked ourselves and others several important questions.

Our first step in planning a WWW course was to analyze the potential student audience.

- Why do they need the information to be taught in this course?
- What background of experience and academic preparation do they bring to this course
- What access to the Internet do they have?

Other areas of consideration included matters of scheduling and administration.

- How soon must the course be offered?
- How long should it last? (i.e. should it have a fixed start and stop date, specific intervals for work on each part of the course, or should it be a "rolling" enrollment course designed for individuals to take at any time, working at their own pace)
- Is there an experienced distance education administrative unit to provide marketing, registration, and student support services; if not can you provide these services (and what will they cost)?

- Can the course and necessary media be produced within time and cost constraints?

Initial aspects of budgeting and marketing were reviewed by asking:

- Will the students pay for the course or is there a sponsor?
- Is there evidence they have paid comparable amounts for education or training at other times?
- What motivated them?
- Are the resources available to pay for the course equal to the probable costs of course development and delivery?
- Are the students clearly identified as a group?
- Are there cost-effective marketing media available for that group?
- Will they need help in overcoming concerns about using an unfamiliar technology or learning environment?

When it had been determined that there was an audience, funding, and sufficient time to produce the course, we looked at course development considerations.

- Is there a teacher available?
- What is his/her attitude toward distance education and the use of instructional technology?
- Does he/she have experience in teaching in this environment?
- Is his/her preferred teaching style compatible with interactive learning strategies?
- When the course is taught in the classroom, are there laboratory exercises, library resources, or other aspects of the course, which will be difficult to adapt for the Internet environment?
- Will the course be offered to people for whom Western cultural assumptions and (American) English would present barriers to learning course materials and communicating with other students?
- Are there teaching strategies, programming needs, or media production elements which will require extra time and/or funding?
- Can the criteria for successful learning be objectively benchmarked? Does the course sponsor (if there is an outside client) have special requirements or standards not included in the normal academic course?

Next we identified who the stakeholders would be for this project.

- Who will be in the course production team?
- Who will we need to consult if there are delays, unexpected costs, or conflicts?
- Who needs a final report and what should be included in the report?
- Who should receive project evaluation forms when the course is completed?
- What materials will we need when reporting on this project?

### Budgeting

With this information gathered, it was possible to begin building a preliminary budget. Frequent collaboration with faculty and the instructional designer alerted us to potential additional costs to accommodate secondary delivery media (i.e., use of video where motion was essential, use of animated graphic elements, etc.). Review with technology and other production specialists about additional requirements (e.g. interactive software such as spreadsheets, chat sessions, or file transfer ) also allowed us to see what budgetary implications for course development may exist.

Decisions on whether or not to develop the course was made by matching funding against development costs. The preliminary budget provided a rough estimate of costs sufficient to match against potential income or support funding from internal or grant sources. An excess of costs over funding would have suggested areas of the budget to review in order to find a development approach that matched funding limits.

### Student Services

As was mentioned earlier, the administrative issues of course development also included attention to student services, marketing, and the communications media. It was important to review distant students' access to registration, to book store and library services, and to advisement and transcript services. Internet access, 800 telephone numbers, and evening or weekend hours for interaction were essential to meet the needs of the non-traditional student at a distance. Constant monitoring of services also helped to guard against the distant students' needs being placed in lower priority than the on-campus student, resulting in unacceptably slow service for distant students.

### Encouraging Collaboration

As development proceeded, it was important to encourage a continuous collaborative attitude among development team members. Each specialist or production unit brought unique skills to the table. While there was not always agreement about production values or instructional strategies, it was important to listen carefully to each member of the team. That way we were more likely to make choices that would provide the most effective course within the constraints of the budget. Thus, through collaboration we saw a "gestalt" where the course became greater than the sum of its parts. This was particularly evident through the development and utilization of a "seamless" technical interface.

## Creating a Technical Interface

When we reached the stage for actual course programming, we contracted with ArachNet Web Publishing of Columbia, MO. Their programming development team consists of talented professionals from a wide variety of backgrounds—including information design, graphic design/page layout, illustration, programming, server administration, and HTML authoring. The team approach they employ models very closely the way the DLDC team operates. This made the course production and implementation process much easier.

### HTML Software Tools

We cannot stress enough that the development of on-line courses involved a significant amount of time on the part of the faculty, design, and programming teams. The use of software programs that automate Web development can greatly reduce the amount of time spent on initial programming. These programs also enable instructors to avoid worrying about the intricacies of HTML programming when they wish make revisions or updates in their WWW course. There are a variety of software tools that are available for creating HTML documents. HTML editing programs usually allow manual text-based entry of HTML code or "WYSIWYG" (What You See Is What You Get) placement of text, pictures, and other page elements in a browser environment (with HTML generated automatically). Conversion programs also automatically convert documents saved in popular formats like Microsoft Word, WordPerfect, or Rich Text Format to HTML for viewing on the Web. There are a multitude of editing and conversion programs available commercially or as shareware, and each has their own advantages and limitations.

Four of the most popular HTML-creation tools are BBEdit 4.0, Adobe PageMill, HomeSite, and Microsoft FrontPage. While most of them offer HTML editing or creation by the user, there are also a number of programs that will automatically convert existing documents in popular file formats to HTML. Most of these programs are available for downloading as shareware from the Web, with an extensive listing available at Thomas Magliery's HTML Editors and Converter's site: http://union.ncsa.uiuc.edu/HyperNews/get/www/html/editors.html. This site also includes a HyperNews discussion forum regarding the use of a variety of editors and converters.

### Platform Issues

When programming for a WWW course, it was important to determine any platform issues that might need to be addressed. For faculty, platform issues affected how they needed to save digitized files to be incorporated within the WWW course template. Students, however, faced different concerns. Though HTML documents are viewable across any platform, there are many differences in how the information may be displayed. These differences affect graphic appearance, page layout, and accessibility. Additionally, they are often dictated by the user's computer, browser, and connection speed. Team members had to create a set of minimum hardware and software guidelines that allowed the greatest flexibility for reaching the largest audience while still meeting the parameters of the course's technical interface.

### WWW Servers

Once the HTML coding for the course was completed, the next step was to place it on a server where students could access it after enrollment. There were a number of issues that needed to be examined when it came to selecting and/or setting up a Web server to deliver on-line courses.

- Will the nature of transactions occurring on your site require a secure server?
- Will you have access to trained server administration personnel?
- How will institutional politics influence the purchase, location and administration of the web server?
- What hardware platform will be best?
- What web server software package will best suit your needs, and will it run on the intended hardware platform?
- What connection speed will you need?

Furthermore, issues surrounding the scalability of the hardware and software that is to be used and the costs associated with particular solutions must be reviewed. In the vast majority of cases, the selection and implementation of Web servers is a relatively complex event that may require the coordinated efforts of the instructional design team, the campus's computing administration and support personnel. In some cases, it is also a good idea for a technical facilitator be included in the group to mediate between the needs of the units involved with course design and the capabilities of technology. For example, if CPU intensive server applications are planned, then powerful machines should be purchased. Alternatively, if client-side programming languages like Java and JavaScript are going to be used, then CPU speed at the sever level may not be as important. In any event, all interested stakeholders should be polled before the purchase of equipment and the installation of operating systems and Web servers as to the technical needs for their on-line courses. For example, instructors who wish to broadcast lectures using Real Audio technology will have different server needs than instructors wishing to implement interactive discussion forums and on-line examinations.

### Summary

WWW course design and development team members find that each new project is unique with its own set of challenges and opportunities. Each new course often pushes the boundaries of design, development, and delivery a little further into unexplored territory. Some faculty currently developing courses are exploring the use of streaming audio, streaming video, and virtual reality to help students relate course information to the real world. Other faculty are exploring new teaching methods for their courses, creating case studies and cooperative group challenges. Our experiences seem well worth the time, energy, and financial investment in light of appreciative comments from students who were not able to come to campus-based classes, and yet now can reach their goal of lifelong learning.

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## Autobiographical Sketches

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# How to Improve Interactive Video Courses: Lessons Learned From Successes and Failures

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## Background

The University of Minnesota is a large multi-campus public institution with a strong emphasis in research as well as teaching and service. Our interactive television network began in 1991–92 with essentially two converted television studios, one on the Twin Cities campus, and the other on the Morris campus, a small liberal arts college 150 miles northwest of the Twin Cities. Essentially the network was "built" upon T1 lines that were being used for voice and data transmission.

Another important element is that the University of Minnesota is decentralized with considerable autonomy given to various campuses and Centers of the University. At the beginning (about five years ago) we had to start a network that established classroom facilities, developed a network of technical staff and program staff among the campuses of the University of Minnesota and with some non-U of M campuses as well. And to develop and advance programming activity within the priorities established by an all-University advisory body.

Since those early years, less than 5 years ago, we have now developed across the University of Minnesota about 30 ITV facilities of various shapes and sizes ranging from small conference room-like facilities to a large multi-purpose amphitheater-style classroom on the University of Minnesota, Twin Cities campus.

Programming on the UM-ITV network has grown steadily. Credit courses on the network during the past academic year totaled 3,318 hours for 103 credit courses. As courses are evaluated from various perspectives the results inform instructional and programmatic decisions.

## Purpose of Workshop

This workshop will answer the question, "Why should we use technology to deliver instruction?" We'll answer that question drawing upon the experience of two highly successful programs as case studies, Social Work and Forest Products, and the experience of two seasoned distance educators.

### Case Study #1: Social Work

The School of Social Work MSW distance education option actualizes, supports and strengthens outreach and access goals of the School's own mission, the University's land grant mission and U2000 goals. Graduates from the Moorhead and Rochester area consistently state they would not have achieved the MSW degree if not for the distance education option. Graduate social work course delivery to these areas also adds to the advanced education of the social work professional community who petition to take these ITV broadcast courses.

In this presentation, we will address the original design of our distance education program, lessons we have learned from our experiences, conclusions we have made from evaluation data and improvements made as a result. We assess comparability across formats, technology-related issues, effectiveness of the learning process, satisfaction, socialization, and use of library materials, computer services and other support services. Feedback is sought quarterly from faculty and students, and students complete a final evaluation as they finish the program.

We learned that distance students and students on-site at the Twin Cities campus had different expectations regarding their educational experiences in the classroom and that these were reflected in their overall satisfaction with their classes. The actual technology, and often its failure to perform, was the most often cited problem or negative aspect for students and faculty. This was more pronounced for the students taking classes at the "main" campus. Some believed that the technology was an imposition for them and that, because the instructor was physically there with them, they would have been able to proceed without disruptions or delays if ITV was not being utilized. The students at the distance sites, while being frustrated with the breakdowns in technology, were more accepting of it and less negative in their feedback.

As a result of our evaluations, a number of changes have been made:

- Increased time and effort has gone into training each class of students on how to use the distance technology.
- Increased support from technical staff has resulted in a better understanding of technical difficulties, both for faculty and staff as well as students.
- Specific training in the use of the distance-site support resources has been incorporated (library, electronic mail and computer services).
- More detailed individual instruction and support for faculty and their teaching assistants.
- Guidelines specific to SSW distance education have been written and distributed to new instructors.

- A commitment of staff time has been made at the Twin Cities site to coordinate all sites.

- On-going negotiations are made regarding faculty course development time to adequately prepare materials for ITV format.

- Teaching assistants or use of co-instruction are provided for all ITV courses.

- Careful selection of courses and instructors are made to follow the same curriculum guidelines as the traditional program and so that, typically, an instructor new to teaching via ITV teaches a familiar course.

- Library and classroom building access hours have been changed to accommodate weekend hours, when possible.

### Case Study #2: Forest Products

Distance education technology provides enormous potential for improving higher education in forest products, today. Both the teaching and continuing education missions can be enhanced through delivering forest products courses and curricula to communities remote from main campuses. For the Fall 1996 semester, the Wood and Paper Science Department in the College of Natural Resources at the University of Minnesota collaborated with the forest products industry and state community colleges to establish a distance education program in forest products. Three courses were offered in the Fall, followed by one graduate course in the Spring. The program will be expanded to five courses for the Fall 1997 quarter. Our experience with this program confirms our view that the technology is an effective means for addressing the education and extension missions of our department, college, and university.

An overall assessment of the program clearly indicates that the effort is proving successful. There are four oversight elements that make up that assessment. First, a diverse population of students at remote locations enrolled in each course. Second, a small number of students who took courses elected to continue on by transferring down to the main campus to enroll in our department's curriculum. Third, our outreach mission was addressed through remote-site enrollment of professionals in unrelated fields in our courses. Fourth, the program has positioned the department in a position to take advantage of future advances in distance learning technology.

Several elements emerged as crucial to the success of the program from our experience:

- It was essential to our program that we had a genuine three-way partnership in the program, a partnership between the forest products industry, the participating community college, and our department where the courses originated. Each of the three needed to have a stake in the success of the program.

- The faculty at the originating site need to be committed fully to the effort. Preparing course material is difficult and time consuming. Delivering the course requires a set of talents different from that of the traditional classroom.

- The students at the remote sites need to have an understanding of the underlying goals of the program. Courses can be taken just for the education within them, but the originating site has a program vision that transcends the objectives of the course itself. Students need to understand that the courses can be integrated into a complete program.

- The students at the originating site need to have an understanding of the importance of the course delivery to the program. Wood and paper science is called a discovery major—few students begin their academic careers in the discipline. The distance education program is essential to engendering awareness of the major in the minds of students at the remote locations.

- Face-to-face contacts need to be arranged for the students at the remote locations. The faculty members need to visit the remote sites and the remote site students need to visit the originating site.

- The Internet communication between remote site students and the instructor is essential. The traditional student has ample opportunity to meet with the instructor. E-mail must be used to facilitate that kind of communication with remote-site students.

- Students need to have access to personal computers and the Internet to make the program work.

We experienced several problems that were never fully resolved and remain a topic for examination:

- It is very important that the same standards be used in evaluating student performance, regardless of where the student is taking the course. Standards between higher education campuses differ, by their nature.

- It is very difficult for each higher education unit participating in the program to get appropriate credit and remuneration for its participation in the partnership. Remote-site students register either at the remote school (community college) or the originating school site. The registration site is the only school that gets credit.

- The development of courses is very costly and time-consuming. There are not sufficient mechanisms to support course adaptation to distance delivery. The weight of the problem, by necessity, falls on the instructor who already has a traditional course and a full workload.

- Students need to be prepared fully for participation in the course. Computer skills are needed to communicate via Web and e-mail with the instructor. A general awareness of the distance learning classroom is needed for the efficient conduct of each of the courses.

## Evaluation

Student response to technology delivered instruction is a critical factor. Student course evaluations collected across the University of Minnesota provide important student perspectives on the strengths and weaknesses of distance delivered instruction.

## Summary

The University of Minnesota continues to offer, evaluate, and adapt interactive television courses to work within the strengths of the distance delivery technology and to satisfy student needs. Our successes are, in part, based on the information shared by colleagues at other institutions. In the same manner it is our hope that by presenting this workshop we can provide information that will be helpful to others.

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# Designing Multiple-Technology Distance Education Programs That Work!

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## Introduction

There is an adage that proclaims "When all you have is a hammer, everything looks like a nail." Unfortunately, many curriculum planners approach distance education instructional design that same way, selecting a single tool/technology and basing entire courses and programs on that single delivery mode. The emergence of courses and programs delivered solely via a single technology, such as the "ITV course" or the "Internet course," indicates a drifting away from a focus on the learner—and achievement of learning outcomes—as the driving force for determining delivery modes.

It has also been said that learning technologies are changing faster than you can say "electronic literacy." What is driving these changes is the availability of technology itself—it's faster and cheaper, it's breaking down traditional barriers, and it's creating new opportunities for learning. But technical wizardry, by itself won't produce desired learning outcomes. Creating and implementing successful learning systems—ones that actually enhance learning—requires a thoughtful blend of educational philosophies, new technology, and solid instructional design.

The array of distance learning delivery modes and technology (e.g., interactive television, on-line computer [Internet/intranet], video-based telecourses, audio conferencing, multimedia simulations, optical storage technology [CD/ROM and CDI], in addition to the traditional on-site/in-person and printed modes) is dazzling, indeed. As a result, faculty members face a medley of alternatives from which to select strategies for accomplishing learning goals and objectives.

Given, then, this wide and ever-expanding array, how should decisions be made in order to best match desired academic outcomes with distance learning technology?

## The Model

One way to visualize this is through the Distance Learning Curriculum Matrix, depicted in Figure 1.

Completion of the cells of this matrix enables the curriculum development team to match desired academic outcomes/course objectives to the learning activities best able to facilitate their accomplishment. Then, the most appropriate distance learning technology(ies) can be chosen to take optimal advantage of the strengths and attributes of the particular learning technology in facilitating learner attainment of program and course outcomes. Successful distance education system development and implementation can best be attained by adhering to a simple three-step process:

### A. Specify learning outcomes

First, learning outcomes must be specified for both (1) academic programs, and (2) each course within those programs.

#### 1. Academic programs

These learning outcomes should be consistent with current and forecasted needs of constituent groups and should clearly specify what the curriculum is designed to accomplish. According to Diamond (1989), faculty involvement is a key ingredient; "the faculty must have ownership in the process, retaining responsibility for teaching and academic content." Faculty and administrators must work together to assess the demand for various academic programs and particularly for degree completion opportunities. Further, to the extent that professional certification programs are applicable, requirements and guidelines in those programs should also weigh heavily into determination of outcomes. The same would apply to state-certified programs. The ability of the educational organization to offer complete academic and/or professional certification programs is substantially enhanced by the fact that technology-based distance learning systems can enable cost-effective access even when only a small number of learners are based in a particular location. Combining several sites to form one "class" or section allows for cost-effective program delivery to small "low enrollment" sites.

#### 2. Specific courses within academic programs

Following, or in conjunction with, determination of each program's essential outcomes, desired course competencies or learning objectives (what the student should know or be able to do as a result of successful course completion) should be determined. Course goals and objectives should be determined by faculty members, working with other members of their department and shared with students prior to the beginning of the instructional process. Doing so establishes "direction" for the learners and allows for "buy-in" and self-motivation by learners.

Learning assessment processes should also be specified. As advocated by Measelle and Egol (1992), and others, teaching and assessment should be aligned with curricular objectives, and incorporation of multiple measures of performance is touted by assessment advocates. This practice is encouraged in order to more adequately address the variety of learning styles exhibited by students and to pinpoint the things that can enhance student academic achievement. Locally-developed tests, standardized tests, projects, portfolios, case studies, self-evaluations, surveys, and a variety of other forms of evaluation are contained in the menu of performance measures. Each of these can be used effectively in a distance learning environment if careful planning occurs and if needs support systems are available. Assessment processes should occur prior to instruction (pre-assessment), during instruction (formative assessment), and after instruction (summative assessment).

### B. Determine learning activities and teaching strategies which support accomplishment of outcomes

After clearly establishing desired learning outcomes and how they can be assessed, the distance education curriculum development team will select the most appropriate learning activities. We know that learning outcomes can be accomplished in a variety of ways: reading, writing, oral presentations, psychomotor demonstrations, etc. This means that the faculty member is responsible for determining which learning activities or instructional methods will be adopted in order to best help learners accomplish objectives. Students' current knowledge base (determined by pre-assessment), ages, grade levels, educational backgrounds, experiences, and/or attitudes toward the faculty member or the subject, as well as students' learning styles and faculty member's strengths and skills must also be considered in designing and implementing appropriate instructional strategies. Further, recent trends have favored actively engaging students in directly experiencing the learning process, as manifested through students' performances, hands-on demonstrations, presentations, etc.

**C. Select distance learning delivery modes/technology which support essential outcomes and learning activities**

Once desired outcomes, assessment plans, and appropriate learning activities are established, attributes of distance learning technologies must be thoughtfully considered in selecting delivery modes or technologies which best facilitate achievement of learning outcomes. Not all technologies are equally capable of supporting all learning activities. As an example, if an important learning outcome is that students hone group interaction and/or oral presentation skills, appropriate distance learning technologies could include interactive television or audio conferencing, rather than exclusive use of on-line computer, one-way video, or text-based materials and processes. Similarly, having students interpret a situation involving visual cues will require employing technologies that incorporate visual and motion capabilities (e.g., video tapes, interactive television, multimedia simulations). Most comprehensive courses will require a variety of learning activities supporting a wide range of desired learning outcomes. Therefore, it is reasonable to recognize that a variety of technologies will need to be deployed to support a complex and comprehensive course. It is a weakness of our current way of thinking about distance education that we sometimes try to develop an entire course, while relying on a single technology (e.g., the "Internet" course, or the "ITV course") rather than using a variety of technologies to support the complexities of a course worth taking.

## Conclusion

In summary, in order to facilitate active student learning, distance learning systems must be thoughtfully designed considering how to best match available distance learning modes/technologies with instructional objectives and strategies. Students and faculty alike will be most satisfied when technologies are deployed, not as an end in itself, but as a means to facilitate and support learning and instructional goals.

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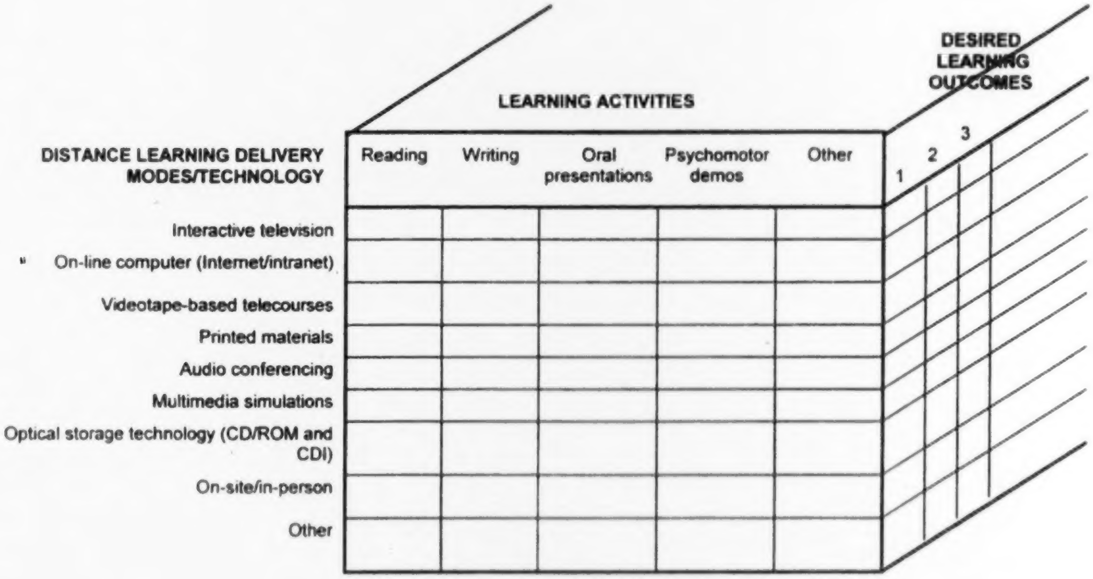

| DISTANCE LEARNING DELIVERY MODES/TECHNOLOGY | Reading | Writing | Oral presentations | Psychomotor demos | Other |
|---|---|---|---|---|---|
| Interactive television | | | | | |
| On-line computer (Internet/intranet) | | | | | |
| Videotape-based telecourses | | | | | |
| Printed materials | | | | | |
| Audio conferencing | | | | | |
| Multimedia simulations | | | | | |
| Optical storage technology (CD/ROM and CDI) | | | | | |
| On-site/in-person | | | | | |
| Other | | | | | |

*Figure 1. Distance learning curriculum matrix*

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# Implementing the Principles of Learning and Teaching at a Distance Using Flexible Learning

Richard Schafér

We bring the learners together at the University electronically.

Flexible Learning provides effective alternative learning environments for people desiring to expand their professional and personal development.

Flexible Learning emphasizes the variety of unique needs and wants of the learner. These needs and wants are specifically recognized with a tailored learning environment allowing individuals to achieve more and excel in their field. Flexible Learning places the psychological needs, learning styles and environment of the student at the core of the educational experience by featuring three distinct characteristics in our programs: performance based learning, diverse presentation methods using media and technology, and structured student support.

The Flexible Learning program adapts daily to new, different, or changing requirements. We design Flexible Learning programs to adjust to the rapidly changing world effectively and efficiently by placing the learner in the center of the educational experience. And, when our experience with a number of emerging communications technologies is coupled with this "students first" mentality, the student—not the teacher or administrator—becomes the focus of our carefully tailored learning experience.

Flexible Learning is re-shaping the norms concerning technological-based distance learning. Flexible Learning uses cutting-edge interactive technology to enrich learning, research and performance. This on-line program provides for team formation, leadership, collaboration and overall effectiveness.

Our design strategy focuses on three key elements: the people, the process, and the product.

**The people.** Learners will most likely be individuals from around the world. They are a diverse population of non-traditional students, traditional college students, student living outside the U.S., military personnel, homebound or place-bound students, retirees, full-time homemakers and persons with disabilities.

**The process.** The philosophy of Flexible Learning emphasizes that each learner has a variety of unique needs and wants. When these needs and wants are specifically recognized and a tailored learning environment is created, the individual can achieve more. Flexible Learning aims to place the psychological needs, learning styles, and environment of the student at the core of the educational experience by featuring three distinct characteristics in its programs: clearly designed learner outcomes, diverse media and technology, and structured student support.

**The product.** We design our courses on the World Wide Web so they offer a range of participatory and interactive experiences for the learner. Our courses capitalize on the multimedia learning environment that the World Wide Web offers to accommodate many kinds of learning styles. Visit our web site to try out demonstration versions of our courses.

The University of Wisconsin-Extension, with its many partnerships, is in a unique position to provide a learner-centered, collaborative environment for learning knowledge, skills, research and application through the Internet on the WWW.

We "design for performance," which is essential to the success of the distance learner. This understanding and experience in applying effective strategies in learning and teaching has taught us that the learner is best served by curriculum that embraces: clearly designed performance-based outcomes, interactive instructional strategies, authentic assessment, and creating a student-centered learning environment. We use a number of interactive learning tools including collaboration and overall effectiveness.

### Using the Learning/Education Program

Our Learning suite is an innovative learning software that allows interaction with interconnected Notes databases providing a flexible, dynamic environment for developing, deploying and delivering courses as well as for supporting and augmenting face to face training. This includes:

**A schedule/syllabus.** This allows participants to navigate through course materials including times frames, authors and teams. The schedule links participants to reading, assignments and assessments.

**A library/media center.** A library media center is a knowledge base for articles, notes, multimedia, the World Wide Web and other resources.

**A course room/classroom.** The interactive environment for learners allows for discussions among each other and with the instructor, to share information and to complete team assignments. The course room allows participants to work in teams and enable cooperative learning that is both learner-to-learner and instructor-to-learner.

**Participant profiles.** Participant profiles provides participant descriptions about professional and personal education, experience and interests.

**Assessment/evaluation.** Evaluation for both formative and summative assessment is posted in the schedule and are sent to and are only accessible by the instructors. Instructors then review, grade, and provide feedback to the learner.

The University of Wisconsin-Extension and/with its many partnerships are in a unique position to provide a learner-centered, collaborative environment for learning in the areas of medical research and application using the international reach of the WWW.

# Designing Instruction Based on Naturally Occurring Interactions

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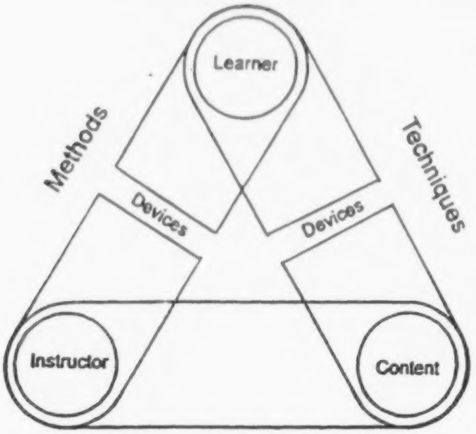
Traditional models of instructional design are usually based upon a linear progression of design activities beginning with audience analysis moving to setting learning goals and objectives, selecting the instructional objectives, and learning task analysis. These activities are followed by selection of devices to deliver the instruction. The advent of rich technological environments have changed traditional approaches to teaching and learning. We now start with the notion of the device and then design our instruction for the media. In the age of smart devices, many new instructional approaches are enabled and even invented.

We conceptualized the distance education setting as being comprised of methods (distance education, or the way learners are organized in society), techniques (teaching procedures, or the way in which subject matter is introduced to learners), and devices (equipment, or the things we used to assist us in providing the instruction). Burnham and Seamons (1987) updated the framework that Verner (1962) introduced over 30 years ago to accommodate electronic distance education. The drawing provides a representation of a learning situation where methods and techniques are enabled by devices to bring learners in contact with instructors and subject matter content (Stubbs & Burnham, 1990).



Building on the framework provided, we propose a newer model of instructional development which is neither fastened to a step-wise model, nor is bound to a particular technology. The model is a research-based instructional design founded on the interactive and collaborative activities of learners in the distance education classroom. The research foundation of this design model involved observation at four remote locations of 11 different courses across two academic sessions delivered via audiographic teleconferencing. The focus of the observation was learner interaction behaviors. This approach allowed the observer to carefully document the students' interactions during class sessions.

The literature reports the theoretical identification of four types of learner interaction (Moore, 1989; Hillman, Willis & Gunawardena, 1994): learner-instructor, learner-content, learner-learner, and learner-interface (the mediating technology). The research upon which this instructional design model is based discovered a fifth type of interaction, learner-environment. Beyond the identification of another type of interaction, the research study empirically verified all five types of interaction and expanded on what is known about the individual interactions.

Learners interacted with the technology interface to varying degrees. The research study showed that they interacted most with the technical assistants, second most with the microphone, and least of all with the technology that provided the visual component of the system. Since the technical assistants were at the site with the learners, it was more common for the students to ask questions of the technical assistants about the procedures of the class than to interrupt the entire class for the question. Interaction with instructors and other learners who were not at the local site required the use of the audio system. This use of the interface became almost second nature: press a switch then speak. The interface was most noticeable when it failed.

Learners interacted with their environment at these remote sites like autonomous adults. They took care of their needs and did not ask for permission. The adult learners both met their own needs and completed the requirements for the course. The research study found that there were four observed objectives for the learner-environment interaction: achieving comfort, relieving boredom, adjusting for their busy lives, and facilitating learning.

In the observed remote sites the learners' interactions with their instructors were influenced by the interface between them. Learners at the remote sites were required to press a microphone switch to speak to the instructor or learners at other sites. Tests and homework assignments were given to the technical assistant, who passed them on to the instructor and returned them to the learners. Unlike a face-to-face classroom, this system had many classrooms at a distance from one another. The learners interacted with the instructors as individual learners, as a group of learners at individual sites, and as the entire class across the state. When there were learners in the classroom with the instructor, their interactions with other learners, both at the same site and across the state, were filtered through the instructor. But, when the instructor was at a distance, the interaction with the instructor was often filtered through the other learners before interacting with the instructor.

**Table 1. Information Known About Interactions Based on Observations of Learners**

| Interaction Type | Information |
|---|---|
| Learner-Interface | Learners interacted with the technology and technical assistants.<br>Learners were generally required to interact with the technology in order to interact with the instructor and learners at other sites, and became second nature.<br>Technical assistants were the human face of the university for the learners to see and speak with. |
| Learner-Environment | Learners achieved comfort.<br>Learners relieved boredom.<br>Learners made the best of busy lives.<br>Learners facilitated learning. |
| Learner-Instructor | The interaction was both facilitated and hindered by the technology.<br>Interaction with individuals, sites, and the class statewide.<br>Learners behaved differently at remote sites than they did where the instructor was present.<br>Questions to instructors were usually preceded by questions to local learners. |
| Learner-Learner | Learners interacted mostly with learners at the same site.<br>The subject of interaction ranged from current course content to life in general.<br>The purposes of the interaction were<br>– clarifying information,<br>– adding information,<br>– relieving boredom,<br>– socializing, and<br>– following guidance by the instructor.<br>Learners formed peer groups for learning and socializing from learners that they met at the site or knew before the course started. |
| Learner-Content | Observable behaviors were<br>– discussion with instructor,<br>– discussion with other learners,<br>– reading texts,<br>– working problems,<br>– participating on projects and labs, and<br>– taking exams.<br>Sources of content were<br>– instructor,<br>– texts, and<br>– other learners. |

The interactions that learners had with each other were the most frequent. They were in a room with each other, no interface was required for communication, and they moved through the academic term as peers. The reasons that the learners interacted with each other were to clarify course content, add information to that given by the instructor or text, relieve boredom, meet their social needs, or follow the directions of the instructor.

Like most educational settings, in the remote sites distinct peer groups formed. Learners worked together on the content or socialized, and they formed groups because of need or previous acquaintance. All the peer groups in the research study began with two learners. Many of the pairs eventually admitted other learners into their group, but a few deliberately resisted inclusion of other learners.

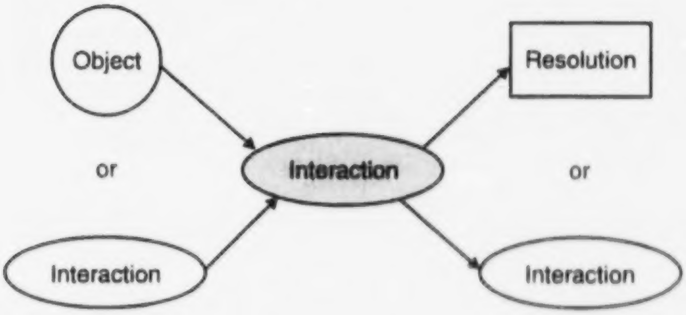
Learners' interactions with the content were not directly observable because those interactions were internal. However, there were behaviors that were indicators of learner-content interactions. Those behaviors included discussing the content with the instructor or other learners, reading texts, working problems, and participating in classroom projects. There were multiple sources of content: the instructor, the texts, and other learners. Because these learners were not in the classroom with the instructor, they had an opportunity to acquire additional content from each other.

Even though we have discussed individual interaction events, we should mention that many of the interactions overlapped. For example, the learners interaction with the interface was required to interact with the instructor. Many times, interaction with other learners was an indicator of interaction with the content of the course.

Interaction structures were also discovered during the research project. The structure of learner interactions involved an object of interaction, the thing that the learner was interacting with; and a subject of interaction, what the interaction was about.

| **Learner Interaction** | = | **Subject** | + | **Object** |
|---|---|---|---|---|
| | | Content | | Environment |
| | | Process | | Interface |
| | | Not related | | Instructor |
| | | | | Other learners |
| | | | | Content |

Learner interactions are not just single events. The interactions are connected to other events. An interaction is preceded and presumably caused by some other event. Something that is normally an object of an interaction can also prompt an interaction. For example, a failure of the audio system may prompt the learner to interact with the system to resume the instruction. Another interaction may also prompt an interaction. For example, a learner's question to another learner my prompt learner-content interaction. An interactions is followed or ended by some other event. That ending may be the resolution of the original cause. That ending may also be an interruption by another interaction. Thus, there are naturally occurring chains and webs of learner interactions.



If the instructor is aware of and can identify naturally occurring learner interactions and what can prompt or preempt them, instruction can be designed or to take advantage of beneficial interactions to foster learning. There are actions that the instructor can take to encourage each of the five types of interaction. That is, interaction with one of the objects on the part of the learners can be prompted and aimed towards the intended outcome, the acquisition of the content. The instructor, as one of the objects of interaction also has the ability to influence the chain of interactions.

The interfacing media is necessary for the delivery of instruction to the learners. For the instruction to be the most beneficial for the learners, the interface must work as well as possible. For this to happen the instructor must be comfortable with the technology and those who facilitate the use of the technology. Instructors should also demonstrate to the learners that they respect their right to the best possible learning situation.

In the distance education setting, the adult learners are closer to their environment than they are to their instructors. The instructors have less influence on the learners than the environment has. These are adults who are accustomed to running their own lives. These classrooms are part of their lives. Instructors can best encourage beneficial behavior by first acknowledging that these adults know how to take care of their own needs and at the same time facilitate their own learning. Some behaviors can be heard or, in some systems, seen. Those behaviors that are disruptive should not be ignored, but instead at a minimum questioned.

Instructors can encourage learner-instructor behaviors by asking questions and encourage discussions beyond simple answers. Questions may either be directed to individuals or to all learners at a given site. Those question may either be spur of the moment question/answer or may be give to the learner for a later answers.

Adult learners frequently learn together. Rather than trying to stop the conversations that occur in the distant classrooms, these conversations may be guided. Some learners form partnerships naturally, others may need to be encouraged, or assigned. Sites may be guided to have local discussions and report the results to the entire class. The natural tendency for these learners to be social creatures makes group learning a natural extension of a social need.

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**Table 2. Recommended Instructional Strategies to Beneficially Influence Learning**

| Interaction Type | Instructional Strategies |
|---|---|
| Learner-Interface | Practicing with equipment (instructor and learners)<br>Setting example of appropriate use of equipment<br>Directing technical assistants<br>Quick response to failure of the interface and validation of the learners' need for the interface |
| Learner-Environment | Setting psychological environment<br>Guiding behavior<br>Acknowledgment of physical needs<br>Feedback about learner behavior |
| Learner-Instructor | Directed questions<br>– To individuals<br>– To sites<br>Pre-notified questions<br>– To individuals<br>– To sites<br>Expanded discussion |
| Learner-Learner | From learning partnerships<br>Encourage site discussions |
| Learner-Content | Ask questions<br>Direct site discussions<br>Set up learning experiences |

The content of the courses is the focus of the instruction. The acquisition of the content is the goal of the instructor and, we hope, of the learner. Interaction with the content is necessary. This interaction can be encouraged by asking questions that require the learner to think about the content, encourage discussion that requires taking about the content, and setting up learning experiences that require the learner to interact with the content.

Instructors have more influence in the distant classrooms than they may believe. Making use of the inertia of naturally occurring interactions increases the strength of that influence.

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